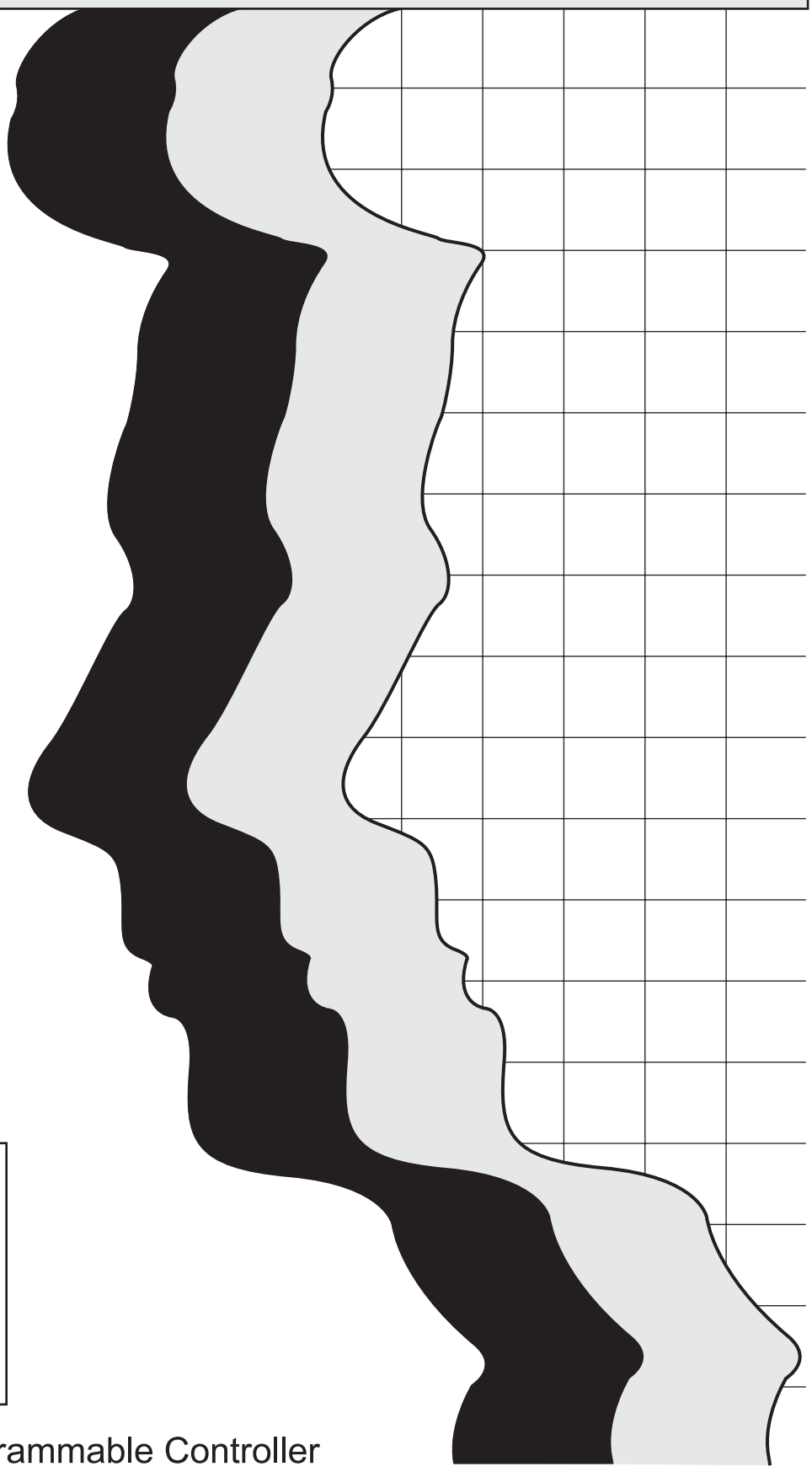
MITSUBISHI

Digital-Analog Converter Module Type AJ65SBT2B-64DA

User's Manual



A

MELSEC

Mitsubishi Programmable Controller

●SAFETY PRECAUTIONS●

(Be sure to read these instructions before use.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.
The instructions given in this manual are concerned with this product. For the safety instructions of the programmable controller system, please read the CPU module user's manual.
In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".

DANGER	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Note that the CAUTION level may lead to a serious consequence according to the circumstances. Always follow the instructions of both levels because they are important to personal safety.

Please save this manual to make it accessible when required and always forward it to the end user.

[Design Precautions]

DANGER

- Configure a safety circuit so that the safety of the overall system is maintained even if an external power failure or a programmable controller failure occurs. Incorrect output or malfunction can lead to an accident.
  (1) The status of analog output changes depending on the setting of various functions that control the analog output. Take sufficient caution when setting for those functions. For details of analog output status, refer to Section 3.4.1.
  (2) Normal output may not be obtained due to malfunctions of output elements or the internal circuits. For output signals that may cause a serious accident, provide an external monitoring circuit.

CAUTION

- Do not install the control or communication cable(s) together with the main circuit or power cables. Keep a distance of 100mm (3.94 inches) or more between them.
  Doing so may cause malfunctions due to noise.

- At power ON/OFF, voltage or current may instantaneously be output from the output terminal of this module.
  In such case, wait until the analog output becomes stable to start controlling the external device.

[Installation Precautions]

⚠ CAUTION

- Use the module in an environment that meets the general specifications given in this manual.
  Operating it in any other environment may cause an electric shock, fire, malfunction, product damage or deterioration.

- For protection of the switches, do not remove the cushioning material before installation.

- Securely fix the module with the DIN rail or fixing screws. Fixing screws must be tighten within the specified torque range.
  A loose screw may cause a drop of the module or malfunction.
  Overtightening may damage the screw, resulting in a drop of the module or malfunction.

- Do not directly touch any conductive part of the module.
  Doing so may result in a malfunction or failure of the module.

[Wiring Precautions]

⚠ CAUTION

- Be sure to shut off all phases of the external power supply used by the system before installation or wiring. Failure to do so may cause a damage to the product and/or malfunctions.

- Always ground the FG terminal to the protective ground conductor.
  Failure to do so may result in malfunctions.

- Be sure to tighten any unused terminal screws within a tightening torque range. Failure to do so may cause a short circuit due to contact with a solderless terminal.

- Use applicable solderless terminals and tighten them with the specified torque.
  If any solderless spade terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.

- Check the rated voltage and terminal layout and then wire the module correctly.
  Connecting a power supply of a different voltage rating or incorrect wiring may cause a fire or failure.

- Tighten terminal screws within the specified torque range.
  A loose terminal screw may cause a short circuit or malfunction.
  Overtightening can cause a short circuit or malfunction due to damage of the screws or module.

- Take care to prevent foreign matter such as dust or wire chips from entering the module.
  Failure to do so may cause a fire, failure or malfunctions.

[Wiring Precautions]

⚠ CAUTION

- Place the connection wires and cables in a duct or clamp them.
  If not, dangling cables may swing or inadvertently be pulled, resulting in damage to the module and/or cables or malfunctions due to poor cable connection.

- Do not install the control cable(s) together with the communication cable(s).
  Doing so may cause malfunctions due to noise.

- When disconnecting the cables from the module, do not hold and pull the cable part.
  Disconnect the cables after loosening the screws in the portions connected to the module.
  Pulling the cable that is still connected to the module may damage the module and/or cable and cause malfunctions due to poor cable connection.

[Starting and Maintenance Precautions]

⚠ CAUTION

- Do not touch the terminals while the power is on.
  Doing so may cause malfunction.

- Be sure to shut off all phases of the external power supply used by the system before cleaning or retightening the terminal screws.
  Not doing so can cause the module to fail or malfunction.
  Undertightening can cause a drop, short circuit or malfunction.
  Overtightening can cause a drop, short circuit or malfunction due to damage of the screws or module.

- Never disassemble or modify the module.
  This may cause breakdowns, malfunction, injury and/or fire.

- Do not drop or apply any strong impact to the module.
  Doing so may damage the module.

- Be sure to shut off all phases of the external power supply used by the system before mounting or dismounting the module to or from the panel.
  Not doing so can cause the module to fail or malfunction.

- Do not install/remove the terminal block more than 50 times after the first use of the product.
  (IEC 61131-2 compliant)

- Before handling the module, always touch grounded metal, etc. to discharge static electricity from the human body. Failure to do so can cause the module to fail or malfunction.

[Disposal Precautions]

⚠ CAUTION
● When disposing of this product, treat it as industrial waste.

REVISIONS

*The manual number is given on the bottom left of the back cover.

Print date	*Manual number	Revision
Aug., 2008	SH(NA)-080768ENG-A	First edition

Japanese Manual Version SH-080729-A

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INTRODUCTION

Thank you for choosing Mitsubishi general-purpose programmable controller.
Before using this product, please read this manual carefully to fully understand the functions and performance of the programmable controller to ensure correct use.

CONTENTS

SAFETY PRECAUTIONS ••••••

4.3.1 Transmission speed auto-tracking function ••••••

ABOUT MANUALS

The following manuals are also related to the product.
Refer to the following table for ordering a manual.

Related manuals

Manual name	Manual number (model code)
CC-Link System Master/Local Module Type AJ61BT11/A1SJ61BT11 User's Manual Describes the system configuration, performance specifications, functions, handling, wiring, and troubleshooting of the AJ61BT11 and A1SJ61BT11. (Sold separately.)	IB-66721 (13J872)
CC-Link System Master/Local Module Type AJ61QBT11/A1SJ61QBT11 User's Manual Describes the system configuration, performance specifications, functions, handling, wiring, and troubleshooting of the AJ61QBT11 and A1SJ61QBT11. (Sold separately.)	IB-66722 (13J873)
CC-Link System Master/Local Module User's Manual Describes the system configuration, performance specifications, functions, handling, wiring, and troubleshooting of the CC-Link module. (Sold separately.)	SH-080394E (13JR64)
Type AnSHCPU/AnACPU/AnUCPU/QCPU-A (A Mode) Programming Manual (Dedicated Instructions) Describes the instructions extended for the AnSHCPU/AnACPU/AnUCPU. (Sold separately.)	IB-66251 (13J742)

COMPLIANCE WITH THE EMC AND LOW VOLTAGE DIRECTIVES

(1) For programmable controller system

To configure a system meeting the requirements of the EMC and Low Voltage Directives when incorporating the Mitsubishi programmable controller (EMC and Low Voltage Directives compliant) into other machinery or equipment, refer to the "EMC AND LOW VOLTAGE DIRECTIVES" chapter of the User's Manual for the CPU module used. The CE mark, indicating compliance with the EMC and Low Voltage Directives, is printed on the rating plate of the programmable controller.

(2) For the product

For the compliance of this product with the EMC and Low Voltage Directives, refer to the "CC-Link module" section in the "EMC AND LOW VOLTAGE DIRECTIVES" chapter of the User's Manual for the CPU module used.

GENERIC TERMS AND ABBREVIATIONS

Unless otherwise specified, the following generic terms and abbreviations are used in this manual to describe the AJ65SBT2B-64DA digital-analog converter module.

Generic term/ abbreviation	Description
GX Developer	Generic product name for product types SWnD5C-GPPW-E, SWnD5C-GPPW-EA, SWnD5C-GPPW-EV, and SWnD5C-GPPW-EVA "n" in the model name is 4 or greater.
ACPU	Generic term for A0J2CPU, A0J2HCPU, A1CPU, A2CPU, A2CPU-S1, A3CPU, A1SCPU, A1SCPUC24-R2, A1SHCPU, A1SJCPU, A1SJCPU-S3, A1SJHCPU, A1NCPU, A2NCPU, A2NCPU-S1, A3NCPU, A3MCPU, A3HCPU, A2SCPU, A2SHCPU, A2ACPU, A2ACPU-S1, A3ACPU, A2UCPU, A2UCPU-S1, A2USCPU, A2USCPU-S1, A2USHCPU-S1, A3UCPU, and A4UCPU
QnACPU	Generic term for Q2ACPU, Q2ACPU-S1, Q2ASCPU, Q2ASCPU-S1, Q2ASHCPU, Q2ASHCPU-S1, Q3ACPU, Q4ACPU, and Q4ARCPU
QCPU (A mode)	Generic term for Q02CPU-A, Q02HCPU-A, and Q06HCPU-A
QCPU (Q mode)	Generic term for Q00JCPU, Q00CPU, Q01CPU, Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU, Q12PHCPU, Q25PHCPU, Q12PRHCPU, Q25PRHCPU, Q02UCPU, Q03UDCPU, Q04UDHCPU, Q06UDHCPU, Q13UDHCPU, and Q26UDHCPU
Master station	A station that controls data link system One master station is required for each system.
Local station	A station that has a programmable controller CPU and can communicate with the master and other local stations
Remote I/O station	A station that treats information in units of bits only (performs input and output with external devices.) (e.g. AJ65BTB1-16D and AJ65SBTB1-16D)
Remote device station	A station that treats information in units of bits and words (performs input and output with external devices and converts analog data.)
Remote station	Generic term for remote I/O station and remote device station This station is controlled by the master station.
Intelligent device station	A station that can perform transient transmission, such as the AJ65BT-R2N (including local stations)
Master module	Generic term for QJ61BT11N, QJ61BT11, AJ61QBT11, A1SJ61BT11, AJ61BT11, and A1SJ61BT11 when they are used as a master station
SB	Link special relay (for CC-Link) Information in units of bits that indicates the data link status and module operating status of the master station/local stations
SW	Link special register (for CC-Link) Information in units of 16 bits that indicates the data link status and module operating status of the master station/local stations
RX	Remote input (for CC-Link) Information input in units of bits from the remote station to the master station
RY	Remote output (for CC-Link) Information output in units of bits from the master station to the remote station
RWw	Remote register (write area for CC-Link) Information output in units of 16 bits from the master station to the remote device station
RWr	Remote register (read area for CC-Link) Information input in units of 16 bits from the remote device station to the master station

PACKING LIST

The following table shows the packing list of the AJ65SBT2B-64DA digital-analog converter module.

Product	Quantity
AJ65SBT2B-64DA digital-analog converter module	1
Digital-Analog Converter Module User's Manual (Hardware) Type AJ65SBT2B-64DA	1

CHAPTER1 OVERVIEW

This manual describes the specifications, handling, and programming methods of the AJ65SBT2B-64DA digital-analog converter module (hereafter abbreviated as AJ65SBT2B-64DA) used as a remote device station in a CC-Link system.

The AJ65SBT2B-64DA is a module that converts digital values (16-bit signed binary data) into analog values (voltage or current).

1.1 Features

This section describes the features of the AJ65SBT2B-64DA.

(1) One module can output analog values from four channels.

One module can output analog values (voltage output or current output) from four channels.
In voltage output, analog values can be output in the range of ±10V.
In current output, analog values can be output in the range of 0 to 20mA.

(2) Output range is selectable per channel.

Analog output ranges can be switched per channel and the I/O conversion characteristics can be changed.

(3) High resolution

By switching the output range, the resolution can be set any of 1/12000, 1/±12000, and 1/±16000, so high-resolution analog values can be obtained.

(4) High accuracy

When the operating ambient temperature is 0 to 55℃, the module performs D/A conversion in accuracy of ±0.3%* at the maximum analog output value. When the operating ambient temperature is 25±5℃, the module performs D/A conversion in accuracy of ±0.2%* at the maximum analog output value.

* Except when noise is applied.

(5) Setting whether to hold or clear analog output while the programmable controller CPU is in the STOP status is possible.

When the programmable controller CPU is in the STOP status or the AJ65SBT2B-64DA has stopped D/A conversion due to an error, whether to hold or clear an analog value output from each channel immediately before the error occurrence can be specified.

(6) Saving man-hour

(a) The module has built-in terminating resistor of 110Ω, which eases wiring.

(b) The transmission speed of the AJ65SBT2B-64DA needs not be set by the user. It is set automatically according to the transmission speed set in the master station.

(7) Maximum 42 modules are connectable.

Maximum 42 AJ65SBT2B-64DA modules are connectable to one master station.

(8) Maintenance is easy.

Since 2-piece terminal block is used, the maintenance is easy.

CHAPTER2 SYSTEM CONFIGURATION

This chapter describes the system configuration for using the AJ65SBT2B-64DA.

2.1 Overall Configuration

This section describes the overall configuration for using the AJ65SBT2B-64DA.

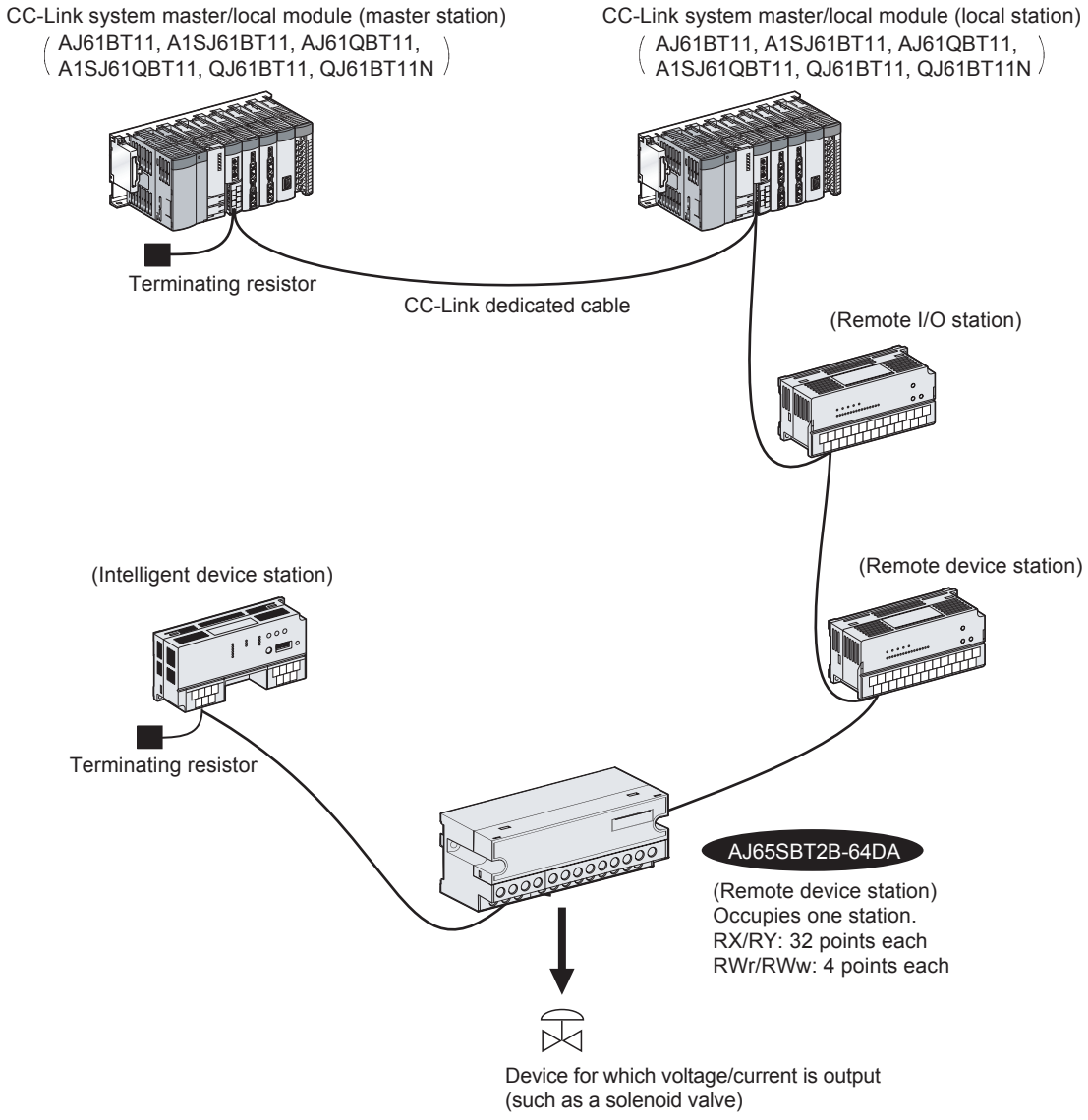

CC-Link system master/local module (master station)
(AJ61BT11, A1SJ61BT11, AJ61QBT11, A1SJ61QBT11, QJ61BT11, QJ61BT11N)
CC-Link system master/local module (local station)
(AJ61BT11, A1SJ61BT11, AJ61QBT11, A1SJ61QBT11, QJ61BT11, QJ61BT11N)
Terminating resistor
CC-Link dedicated cable
(Remote I/O station)
(Intelligent device station)
(Remote device station)
Terminating resistor
AJ65SBT2B-64DA
(Remote device station)
Occupies one station.
RX/RY: 32 points each
RWr/RWw: 4 points each
Device for which voltage/current is output
(such as a solenoid valve)

Figure 2.1 Overall configuration for using the AJ65SBT2B-64DA

2.2 Applicable System

This section describes the applicable system.

(1) Applicable master modules

The following master modules can be used with the AJ65SBT2B-64DA.

- QJ61BT11N
- A1SJ61QBT11
- A1SJ61BT11

* Discontinued models, QJ61BT11, AJ61QBT11, and AJ61BT11 are also applicable.

(2) Restrictions on using the CC-Link dedicated instructions (RLPA, RRPA)

The CC-Link dedicated instructions (RLPA, RRPA) cannot be used depending on the programmable controller CPU and master module used.
For details on restrictions, refer to the user's manual of the master module for A series and Type AnSHCPU/AnACPU/AnUCPU/QCPU-A (A Mode) Programming Manual (Dedicated Instructions).
Dedicated instructions other than the RLPA and RRPA cannot be used for the module.
For a program example using the dedicated instructions (RLPA, RRPA), refer to Section 5.5.

CHAPTER3 SPECIFICATIONS

This chapter describes the specifications of the AJ65SBT2B-64DA.

3.1 General Specifications

This section describes the general specifications of the AJ65SBT2B-64DA.

Table 3.1 General specifications

<table>
<tr><th>Item</th><th colspan="5">Specifications</th></tr>
<tr><td>Operating ambient temperature</td><td colspan="5">0 to 55℃</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="5">-20 to 75℃</td></tr>
<tr><td>Operating ambient humidity</td><td colspan="5">10 to 90% RH, non-condensing</td></tr>
<tr><td>Storage ambient humidity</td><td colspan="5">10 to 90% RH, non-condensing</td></tr>
<tr><td rowspan="8">Vibration resistance</td><td rowspan="8">JIS B 3502 and IEC 61131-2 compliant</td><td colspan="3">For intermittent vibration</td><td rowspan="2">Number of sweeps</td></tr>
<tr><td>Frequency</td><td>Acceleration</td><td>Amplitude</td></tr>
<tr><td>10 to 57Hz</td><td>-</td><td>0.075mm (0.0030 inches)</td><td rowspan="5">10 times each in X, Y, and Z directions (for 80 minutes)</td></tr>
<tr><td>57 to 150Hz</td><td>9.8m/s^2</td><td>-</td></tr>
<tr><td colspan="3">For continuous vibration</td></tr>
<tr><td>Frequency</td><td>Acceleration</td><td>Amplitude</td></tr>
<tr><td>10 to 57Hz</td><td>-</td><td>0.035mm (0.0013 inches)</td></tr>
<tr><td>57 to 150Hz</td><td>4.9m/s^2</td><td>-</td></tr>
<tr><td>Shock resistance</td><td colspan="5">JIS B 3502 and IEC 61131-2 compliant (147m/s^2, 3 times each in X, Y, and Z directions)</td></tr>
<tr><td>Operating atmosphere</td><td colspan="5">No corrosive gases</td></tr>
<tr><td>Operating altitude*3</td><td colspan="5">2000m or lower</td></tr>
<tr><td>Installation location</td><td colspan="5">Inside control panel</td></tr>
<tr><td>Overvoltage category*1</td><td colspan="5">II or lower</td></tr>
<tr><td>Pollution degree*2</td><td colspan="5">2 or lower</td></tr>
</table>

* 1: This indicates the section of the power supply to which the device is assumed to be connected between the public distribution network and the machinery within premises.
Category II applies to devices to which a power is supplied from installed equipment.
The surge voltage withstand for devices with rated voltage of up to 300V is 2500V.
* 2: This index indicates the degree to which conductive material can be generated in terms of the environment where the devices are used.
In the environment corresponding to "Pollution level 2", basically only non-conductive pollution occurs. However, temporary conductivity may occur due to occasional condensation.
* 3: Do not operate or store the programmable controller in the environment where the pressure applied is equal to or greater than the atmospheric pressure at an altitude of 0m. Doing so may cause malfunction.
Please consult our branch office for more information.

3.2 Performance Specifications

This section describes the performance specifications of the AJ65SBT2B-64DA.

Table 3.2 Performance specifications

<table>
<tr><th colspan="2">Item</th><th>AJ65SBT2B-64DA</th></tr>
<tr><td rowspan="2">Digital input value</td><td>Voltage</td><td>16-bit signed binary (-12288 to 12287, -16384 to 16383, -288 to 12287)</td></tr>
<tr><td>Current</td><td>16-bit signed binary (-288 to 12287)</td></tr>
<tr><td rowspan="2">Analog output value</td><td>Voltage</td><td>-10 to 10VDC (external load resistance: 1kΩ to 1MΩ)</td></tr>
<tr><td>Current</td><td>0 to 20mADC (external load resistance: 0 to 600Ω)</td></tr>
<tr><td colspan="2">I/O characteristics, maximum resolution, accuracy (accuracy at the maximum analog output value)</td><td>
<table>
<tr><th rowspan="2"></th><th rowspan="2">Digital input value</th><th rowspan="2">Analog output range*1</th><th colspan="2">Accuracy*2</th><th rowspan="2">Maximum resolution</th></tr>
<tr><th>Ambient temperature 0 to 55℃</th><th>Ambient temperature 25 ±5℃</th></tr>
<tr><td rowspan="5">Voltage</td><td>-16000 to 16000</td><td>-10 to 10V</td><td>±0.3% (±30mV)</td><td>±0.2% (±20mV)</td><td>0.625mV</td></tr>
<tr><td rowspan="2">0 to 12000</td><td>0 to 5V</td><td rowspan="2">±0.3% (±15mV)</td><td rowspan="2">±0.2% (±10mV)</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>0.333mV</td></tr>
<tr><td>-12000 to 2000</td><td>User range setting 2 (-10 to 10V)</td><td>±0.3% (±30mV)</td><td>±0.2% (±20mV)</td><td>0.333mV</td></tr>
<tr><td rowspan="3">Current</td><td rowspan="3">0 to 12000</td><td>0 to 20mA</td><td rowspan="3">±0.3% (±60μA)</td><td rowspan="3">±0.2% (±40μA)</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>1.33μA</td></tr>
<tr><td>User range setting 1 (0 to 20mA)</td><td>0.95μA</td></tr>
</table>
</td></tr>
<tr><td colspan="2">Conversion speed</td><td>200μs/channel</td></tr>
<tr><td colspan="2">Output short protection</td><td>Available</td></tr>
<tr><td colspan="2">Number of analog output points</td><td>4 channels/module</td></tr>
<tr><td colspan="2">Number of writes to Flash memory</td><td>Maximum 10,000 times</td></tr>
<tr><td colspan="2">CC-Link station type</td><td>Remote device station</td></tr>
<tr><td colspan="2">Number of occupied stations</td><td>1 station (RX/RY: 32 points each, RWr/RWw: 4 points each)</td></tr>
<tr><td colspan="2">Connection cable</td><td>CC-Link dedicated cable</td></tr>
<tr><td colspan="2">Withstand voltage</td><td>500VAC between all power supply and communication system terminals and all analog output terminals for one minute</td></tr>
<tr><td colspan="2">Isolation method</td><td>Between communication system terminal and all analog output terminals: photocoupler isolation
Between power supply system terminal and all analog output terminals: transformer isolation
Between channels: non-isolation</td></tr>
<tr><td colspan="2">Noise immunity</td><td>Tested by a noise simulator with noise voltage of 500Vp-p, noise width of 1μs, and noise frequency of 25 to 60Hz.</td></tr>
<tr><td rowspan="2">External connection system</td><td>Communication part, module power supply part</td><td>7-point, 2-piece terminal block
M3 × 5.2 Tightening torque: 59 to 88N・cm
Number of applicable solderless terminals: maximum 2</td></tr>
<tr><td>I/O part</td><td>18-point, 2-piece terminal block
M3 × 5.2 Tightening torque: 59 to 88N・cm
Number of applicable solderless terminals: maximum 2</td></tr>
</table>

Table 3.2 Performance specifications

Item	AJ65SBT2B-64DA
Applicable wire size	0.3 to 2.0mm^2
Applicable solderless terminal	· RAV1.25-3 (IEC 60715 compliant) [Applicable wire size: 0.3 to 1.25mm^2] · V2-MS3, RAP2-3SL, TGV2-3N [Applicable wire size: 1.25 to 2.0mm^2]
Module mounting screw	M4 screw × 0.7mm × 16mm or more (Tightening torque range: 78 to 1.08N · cm) The module can also be mounted to a DIN rail.
Applicable DIN rail	TH35-7.5Fe, TH35-7.5Al (IEC 60175 compliant)
External power supply	24VDC (20.4 to 28.8VDC)
	Inrush current: 1.8A, 2.4ms
	Current consumption: 0.24A (24VDC)
Weight	0.25kg

* 1 The factory default is set to "-10 to +10V".
* 2 Except when noise is applied.

3.3 I/O Conversion Characteristics

I/O conversion characteristics are an inclination of a straight line connecting an offset value and a gain value when a digital input value set from the programmable controller CPU is converted into an analog value (voltage or current output).

An offset value is an analog value (voltage or current) output when the digital input value set from the programmable controller CPU is 0.

A gain value is an analog value (voltage or current) output when the digital input value set from the programmable controller CPU is as follows:
12000 (when 0 to 5V, 1 to 5V, 0 to 20mA, 4 to 20mA, user range setting 1, or user range setting 2 is selected for output range)
16000 (when -10 to 10V is selected for output range)

3.3.1 Voltage output characteristics

A graph for voltage output characteristics is shown below.

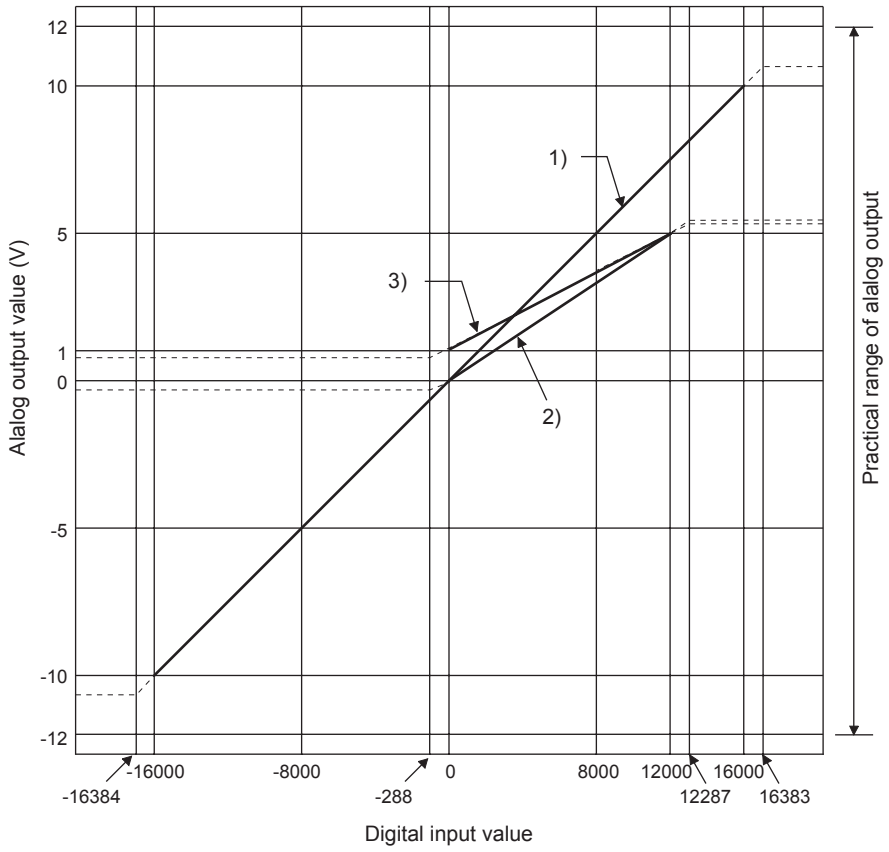


Figure 3.1 Voltage output characteristics graph

Table 3.3 Voltage output characteristics table

Number	Analog output range setting	Offset value	Gain value	Digital input value	Maximum resolution
1)	-10 to 10V	0V	10V	-16000 to 16000	0.625mV
2)	0 to 5V	0V	5V	0 to 12000	0.416mV
3)	1 to 5V	1V	5V		0.333mV
-	User range setting 2 (-10 to 10V)	0V	10V	-12000 to 12000	0.333mV

POINT

(1) The maximum resolution and accuracy will be within their performance specifications range when they are within digital input range and analog output range of each output range.
Outside those ranges, however, they may not fall within the performance specifications. (Avoid using the dotted line parts in Figure 3.1.)

(2) Set the offset/gain values of the user range setting 2 within the range satisfying the following conditions.

(a) Setting range: -10 to 10V

(b) (Gain value) - (Offset value) > 4V

If the values are set outside the range of (a), the "RUN" LED flashes at intervals of 0.5s.
Re-set the values within the setting range.
If the set values do not satisfy the condition of (b), the "RUN" LED flashes at intervals of 0.5s.
Re-set the values.

3.3.2 Current output characteristics

A graph for current output characteristics is shown below.

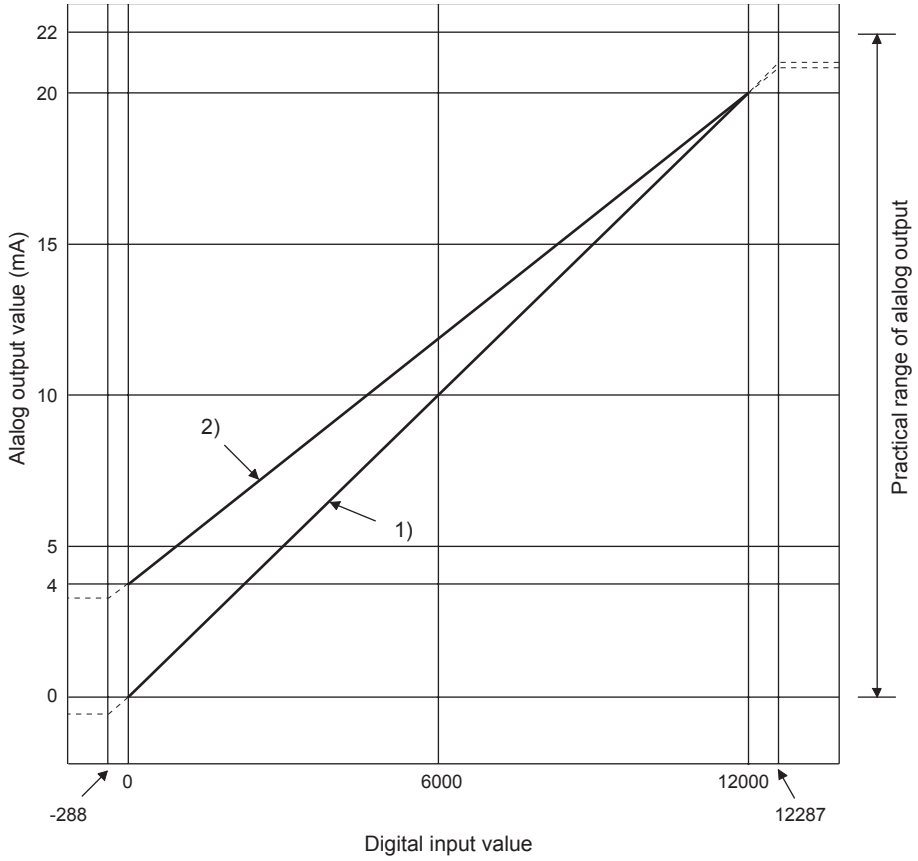


Figure 3.2 Current output characteristics graph

Table 3.4 Current output characteristics table

Number	Analog output range setting	Offset value	Gain value	Digital input value	Maximum resolution
1)	0 to 20mA	0mA	20mA	0 to 12000	1.66μA
2)	4 to 20mA	4mA	20mA		1.33μA
-	User range setting 1 (0 to 20mA)	0mA	20mA		0.95μA

POINT

(1) The maximum resolution and accuracy will be within their performance specifications range when they are within digital input range and analog output range of each output range.
Outside those ranges, however, they may not fall within the performance specifications. (Avoid using the dotted line parts in Figure 3.2.)

(2) Set the offset/gain values of the user range setting 1 within the range satisfying the following conditions.

(a) Setting range: 0 to 20mA

(b) (Gain value) - (Offset value) > 11.5mA

If the values are set outside the range of (a), the "RUN" LED flashes at intervals of 0.5s.
Re-set the values within the setting range.
If the set values do not satisfy the condition of (b), the "RUN" LED flashes at intervals of 0.5s.
Re-set the values.

3.3.3 Relationship between offset/gain setting and analog output value

The resolution of the AJ65SBT2B-64DA can be set by changing settings of the offset/gain values.
Calculation formulas of the resolution for an analog value and the analog output value for a digital input value when the settings of the offset/gain value are changed are shown below.

(1) Resolution

Find the resolution by the following formula.

$$\text{(Analog resolution)} = \frac{\text{(Gain value) - (Offset value)}}{12000}$$

(2) Analog output value

Find the analog output value by the following formula.

$$\begin{pmatrix}\text{Alalog output}\\ \text{value}\end{pmatrix} = \begin{pmatrix}\text{Analog}\\ \text{resolution}\end{pmatrix} \times \begin{pmatrix}\text{Digital input}\\ \text{value}\end{pmatrix} + \begin{pmatrix}\text{Offset value}\end{pmatrix}$$

3.3.4 Accuracy

The accuracy is a value when an analog output value is the maximum value.
Even when the output characteristics are changed by changing the offset/gain setting or output range, the accuracy does not change and is remained within the range shown in the performance specifications.

(1) Accuracy of voltage output

For voltage output, the maximum analog output value varies depending on the range setting.
For example, when 0 to 5V is selected for the output range, the accuracy will be a value at 5V.
Analog value is output in accuracy of within ±0.2% (±10mV) when the operating ambient temperature is 25±5℃, or in accuracy of within ±0.3% (±15mV) when the operating ambient temperature is 0 to 55℃.

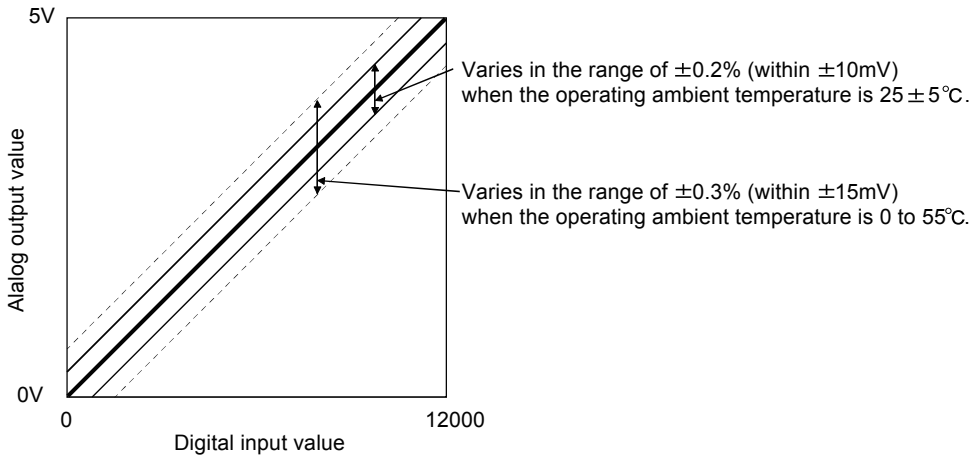

5V
0V
Alalog output value
0
12000
Digital input value
Varies in the range of ±0.2% (within ±10mV)
when the operating ambient temperature is 25±5℃.
Varies in the range of ±0.3% (within ±15mV)
when the operating ambient temperature is 0 to 55℃.

Figure 3.3 Accuracy of voltage output (when 0 to 5V is selected for the output range)

(2) Accuracy of current output

The accuracy of current output is for 20mA.
Analog value is output at accuracy of within ±0.2% (±40μA) when the operating ambient temperature is 25±5℃, or at accuracy of within ±0.3% (±60μA) when the operating ambient temperature is 0 to 55℃.

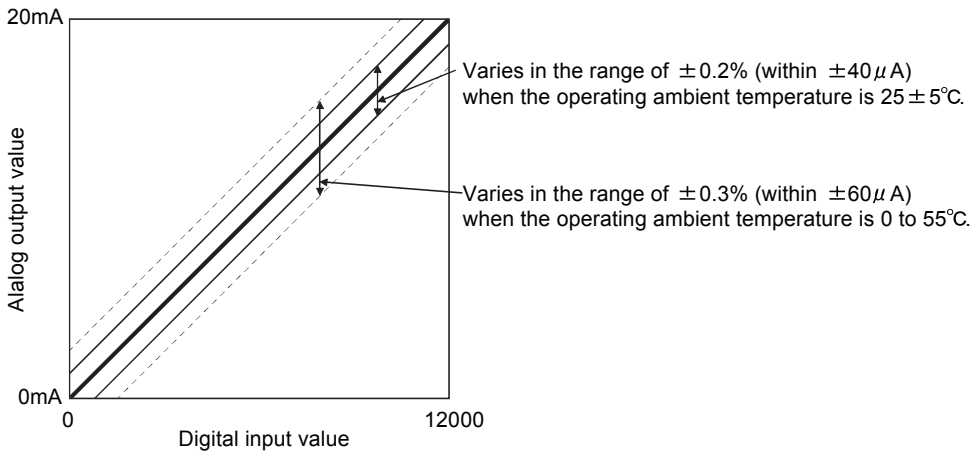

20mA
0mA
Alalog output value
0
12000
Digital input value
Varies in the range of ±0.2% (within ±40μA)
when the operating ambient temperature is 25±5℃.
Varies in the range of ±0.3% (within ±60μA)
when the operating ambient temperature is 0 to 55℃.

Figure 3.4 Accuracy of current output

3.3.5 Conversion speed

Conversion speed of the AJ65SBT2B-64DA is 200μs per channel.
However, the time from when an digital input value is converted into an analog value till when the analog value is output varies depending on "transmission delay time" of the CC-Link system.

(1) Remote device station processing time

Table 3.5 Remote device station processing time

Number of used channels of the AJ65SBT2B-64DA	Remote device station processing time
1	0.4ms
2	0.6ms
3	0.8ms
4	1.0ms

(2) Transmission delay time

For details on transmission delay time, refer to user's manual of the master module used.

(Example) Data link processing time when the master module of the QJ61BT11N is used in asynchronous mode (normal value)

[Calculation formula]

SM + LS × 1 + Remote device station processing time

SM: Scan time of master station sequence program

LS: Link scan time

3.4 Functions

This section describes the functions of the AJ65SBT2B-64DA.

Table 3.6 AJ65SBT2B-64DA function list

Item	Description	Reference
D/A output enable/disable function	Specifies a value to be output, D/A conversion value or offset value, for each channel. Note that the conversion speed is constant regardless of the output enable/disable setting.	Section 3.5.2 (9)
D/A conversion enable/disable function	Sets the D/A conversion enable/disable status for each channel. Setting "Disable" for the unused channel can shorten the conversion speed.	Section 3.5.2 (12)
Output range switching function	Sets the analog output range for each channel and changes the I/O conversion characteristics.	Section 3.5.2 (10)
Analog output hold/clear function when the programmable controller CPU is in the STOP status (HOLD/ CLEAR setting)	Specifies whether to hold or clear an analog value (output an offset value) output from each channel immediately before the programmable controller CPU has entered the STOP status or the AJ65SBT2B-64DA has stopped D/A conversion due to an error, for each channel.	Section 3.5.2 (11)
Offset/gain setting	Sets the offset/gain values using the UP/DOWN switch and changes I/O conversion characteristics freely.	Section 4.8
Transmission speed auto-tracking function	Sets transmission speed automatically according to the setting in the master module when the AJ65SBT2B-64DA is powered on.	-

3.4.1 Combinations of functions

Analog output can be set as shown in Table 3.7, according to the combinations of CH□ Conversion enable/disable setting (RY(n+1)4 to RY(n+1)7), CH□ Analog output enable/disable flag (RYn0 to RYn3), and CH□ HOLD/CLEAR setting (RY(n+1)0 to RY(n+1)3).

Table 3.7 Combination list of analog output status

Setting combination / Execution status	CH□ Conversion enable/disable setting (RY(n+1)4 to RY(n+1)7)	Enable (on)			Disable (off)
	CH□ Analog output enable/disable flag (RYn0 to RYn3)	Enable (on)		Disable (off)	Enable (on) or Disable (off)
	CH□ HOLD/CLEAR setting (RY(n+1)0 to RY(n+1)3)	HOLD (on)	CLEAR (off)	HOLD (on) or CLEAR (off)	HOLD (on) or CLEAR (off)
Analog output status while the programmable controller CPU is in the RUN status		An analog value converted from a digital input value set by the programmable controller CPU is output.		Offset value	0V/0mA
Analog output status while the programmable controller CPU is in the STOP status		An analog value before the programmable controller CPU becomes the STOP status is held.	Offset value	Offset value	0V/0mA
Analog output status while the programmable controller CPU is in stop error		An analog value before the programmable controller CPU becomes the STOP status is held.	Offset value	Offset value	0V/0mA
Analog output status while digital input setting value error occurs at the AJ65SBT2B-64DA		The upper limit or lower limit analog value is output.		Offset value	0V/0mA
Analog output status while the "L RUN" LED turns off/"L.ERR." LED turns on		An analog value before the "L RUN" LED turns off is held.	Offset value	Offset value	0V/0mA
Analog output status while the "L ERR." LED flashes		An analog value converted from a digital input value set by the programmable controller CPU is output.		Offset value	0V/0mA
Analog output status during initial processing completion status after power reset		An analog value converted from a digital input value set by the programmable controller CPU is output.		Offset value	0V/0mA
Analog output status while output range setting error occurs at the AJ65SBT2B-64DA		0V/0mA	0V/0mA	0V/0mA	0V/0mA
Analog output status while watchdog timer error occurs at the AJ65SBT2B-64DA		0V/0mA	0V/0mA	0V/0mA	0V/0mA

POINT

When using the QnACPU, using "Y" as the remote output (RY) refresh device of the auto refresh parameter may not hold the analog value even in HOLD setting. In HOLD setting, use "M" or "B" as the remote output (RY) refresh device.

3.5 Remote I/O Signals

This section describes the assignment and functions of the remote I/O signals.

3.5.1 List of remote I/O signals

Remote input (RX) is an input signal from the AJ65SBT2B-64DA to the master module, and remote output (RY) is an output signal from the master module to the AJ65SBT2B-64DA.
In communications with the master station, the AJ65SBT2B-64DA uses 32 points for the remote input (RX) and the remote output (RY), respectively.

Table 3.8 List of remote I/O signals

Signal direction: AJ65SBT2B-64DA → Master module		Signal direction: Master module → AJ65SBT2B-64DA	
Remote input (RX)	**Name**	**Remote output (RY)**	**Name**
RXn0	Reserved	RYn0	CH1 Analog output enable/disable flag
RXn1		RYn1	CH2 Analog output enable/disable flag
RXn2		RYn2	CH3 Analog output enable/disable flag
RXn3		RYn3	CH4 Analog output enable/disable flag
RXn4		RYn4	CH1 Range setting 0th bit
RXn5		RYn5	CH1 Range setting 1st bit
RXn6		RYn6	CH1 Range setting 2nd bit
RXn7		RYn7	CH2 Range setting 0th bit
RXn8		RYn8	CH2 Range setting 1st bit
RXn9		RYn9	CH2 Range setting 2nd bit
RXnA	Flash memory read error flag	RYnA	CH3 Range setting 0th bit
RXnB	User range read error flag	RYnB	CH3 Range setting 1st bit
RXnC	Flash memory write error flag	RYnC	CH3 Range setting 2nd bit
RXnD	Reserved	RYnD	CH4 Range setting 0th bit
RXnE		RYnE	CH4 Range setting 1st bit
RXnF	Test mode flag	RYnF	CH4 Range setting 2nd bit
RX(n+1)0	Reserved	RY(n+1)0	CH1 HOLD/CLEAR setting
RX(n+1)1		RY(n+1)1	CH2 HOLD/CLEAR setting
RX(n+1)2		RY(n+1)2	CH3 HOLD/CLEAR setting
RX(n+1)3		RY(n+1)3	CH4 HOLD/CLEAR setting
RX(n+1)4		RY(n+1)4	CH1 Conversion enable/disable setting
RX(n+1)5		RY(n+1)5	CH2 Conversion enable/disable setting
RX(n+1)6		RY(n+1)6	CH3 Conversion enable/disable setting
RX(n+1)7		RY(n+1)7	CH4 Conversion enable/disable setting
RX(n+1)8	Initial data processing request flag	RY(n+1)8	Initial data processing completion flag
RX(n+1)9	Initial data setting completion flag	RY(n+1)9	Initial data setting request flag
RX(n+1)A	Error flag	RY(n+1)A	Error reset request flag
RX(n+1)B	Remote ready	RY(n+1)B	Reserved
RX(n+1)C	Reserved	RY(n+1)C	
RX(n+1)D		RY(n+1)D	
RX(n+1)E		RY(n+1)E	
RX(n+1)F		RY(n+1)F	

n: Address assigned to the master station by station number setting

POINT

The "Reserved" devices shown in Table 3.8 are used by the system and cannot be used by the user. If used (turned on/off), the functions of the AJ65SBT2B-64DA will not be guaranteed.

3.5.2 Details of the remote I/O signals

This section describes the functions of each remote I/O signal of the AJ65SBT2B-64DA.

(1) Flash memory read error flag (RXnA)

This flag turns on when an error occurs while reading data from the Flash memory.

If the flag turns on, the AJ65SBT2B-64DA has failed (hardware failure). Therefore, the flag cannot be reset (turned off) by Error reset request flag (RY(n+1)A).

(2) User range read error flag (RXnB)

This flag turns on when an error occurs while reading the user range setting data.

When this flag turns on, re-set the offset/gain values on all channels which use the user range setting.
If the flag turns on again, the module may have failed. Please consult your local Mitsubishi representative, explaining a detailed description of the problem.

(3) Flash memory write error flag (RXnC)

This flag turns on when the number of writes to the Flash memory exceeds the limit (10,000 times).

If the flag turns on, the AJ65SBT2B-64DA has failed (hardware failure). Therefore, the flag cannot be reset (turned off) by Error reset request flag (RY(n+1)A).

(4) Test mode flag (RXnF)

This flag turns on when the module enters test mode.

The flag turns off when the module exits test mode.

Use the flag for an interlock to prevent incorrect output during offset/gain setting.

(5) Initial data processing request flag (RX(n+1)8)

This flag turns on for the AJ65SBT2B-64DA to request the initial data setting after power-on.

The flag turns off when the initial data processing is completed (Initial data processing completion flag (RY(n+1)8) turns on).

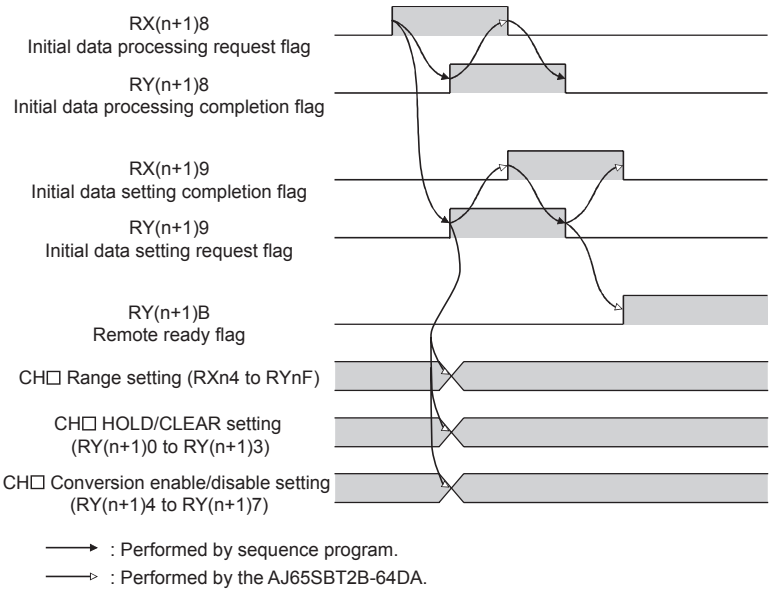


Figure 3.5 Operation at initial setting

(6) Initial data setting completion flag (RX(n+1)9)

This flag turns on after the initial data setting is completed when initial data setting has been requested (Initial data setting request flag (RY(n+1)9) is turned on).

The flag turns off when Initial data setting request flag (RY(n+1)9) is turned off after the initial data setting is completed.

For details on initial data setting, refer to Figure 3.5.

(7) Error flag (RX(n+1)A)

This flag turns on when the output range setting error, digital input value setting error, or Flash memory write error occurs.

This flag does not turn on when the watchdog timer error occurs. (In this case, the "RUN" LED turns off.)

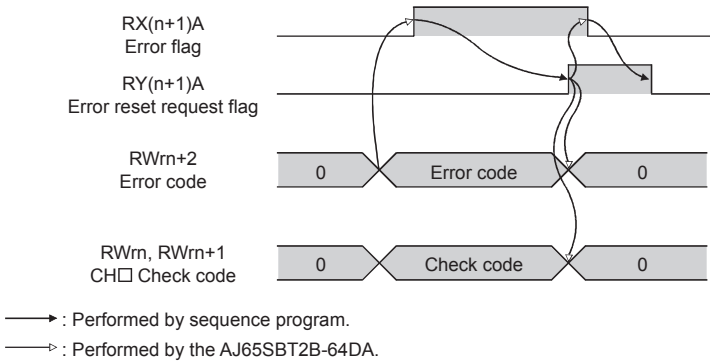


Figure 3.6 Operation at error occurrence and reset

(8) Remote ready (RX(n+1)B)

This flag turns on when initial data setting is completed after power-on or exiting test mode.

Use the flag for an interlock to read/write data from/to the master module.

(9) CH□ Analog output enable/disable flag (RYn0 to RYn3)

This signal is turned on to enable output of the D/A conversion value of the corresponding channel.

Turn off the signal to disable output of the D/A conversion value.

Enabling/disabling outputs is switched at the rising edge, the signal turns from off to on.

(10)CH□ Range setting (RYn4 to RYnF)

The analog output range for each channel is set in 3-bit (refer to Table 3.9).

The default value is set to "-10 to 10V" for all channels.

This setting is activated when Initial data setting request flag (RY(n+1)9) is turned from off to on.

Table 3.9 List of output range settings

Output range	CH4			CH3			CH2			CH1		
	RYnF	RYnE	RYnD	RYnC	RYnB	RYnA	RYn9	RYn8	RYn7	RYn6	RYn5	RYn4
-10 to 10V	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
0 to 5V	Off	Off	On	Off	Off	On	Off	Off	On	Off	Off	On
1 to 5V	Off	On	Off	Off	On	Off	Off	On	Off	Off	On	Off
0 to 20mA	Off	On	On	Off	On	On	Off	On	On	Off	On	On
4 to 20mA	On	Off	Off	On	Off	Off	On	Off	Off	On	Off	Off
User range setting 1 (0 to 20mA)	On	Off	On	On	Off	On	On	Off	On	On	Off	On
User range setting 2 (-10 to 10V)	On	On	Off	On	On	Off	On	On	Off	On	On	Off

(11) CH□ HOLD/CLEAR setting (RY(n+1)0 to RY(n+1)3)

Whether to hold or clear an analog value that was output when the programmable controller CPU has entered the STOP status or an error occurs is set for each channel.

Off: CLEAR
On: HOLD

The default value is set to "CLEAR (off)" for all channels.

This setting is activated when Initial data setting request flag (RY(n+1)9) is turned from off to on.

(12)CH□ Conversion enable/disable setting (RY(n+1)4 to RY(n+1)7)

The D/A conversion enable/disable status is set for each channel.

Off: Disable
On: Enable

This setting is activated when Initial data setting request flag (RY(n+1)9) is turned from off to on.

Setting "Disable"(off) for the unused channel can shorten the D/A conversion speed.

(13)Initial data processing completion flag (RY(n+1)8)

This flag turns on when initial data processing is completed if initial data processing is requested after power-on.

For details on initial data setting, refer to Figure 3.5.

(14)Initial data setting request flag (RY(n+1)9)

This flag is turned on to set or change the initial data.

For details on initial data setting, refer to Figure 3.5.

(15)Error reset request flag (RY(n+1)A)

This flag is turned on to reset (turns off) Error flag (RX(n+1)A) and clear values (set 00_H) in Error code (RWrn+2) and CH□ Check code (RWrn, RWrn+1) of the remote register.

However, Error flag (RX(n+1)A) cannot be reset when the Flash memory write error occurs (Flash memory write error flag (RXnC) turns on). Error flag (RX(n+1)9) also remains on.

3.6 Remote Register

The AJ65SBT2B-64DA has a remote resister for data communications with a master module.
This section describes the assignment and data structure of the remote register.

3.6.1 Remote register list

The following table shows the assignment of remote register.

Table 3.10 Assignment of remote register

Communication direction	Address	Description	Default value	Reference
Master → Remote	RWwm	CH1 Digital input value setting	0	Section 3.6.2 (1)
	RWwm+1	CH2 Digital input value setting	0	
	RWwm+2	CH3 Digital input value setting	0	
	RWwm+3	CH4 Digital input value setting	0	
Remote → Master	RWrn	CH1, 2 Check code	0	Section 3.6.2 (2)
	RWwm+1	CH3, 4 Check code	0	
	RWwm+2	Error code	0	Section 3.6.2 (3)
	RWwm+3	Reserved	0	-

m, n: Addresses assigned to the master station by station number setting

POINT

Do not read/write data to the "Reserved" remote register. If read/written, the functions of the AJ65SBT2B-64DA will not be guaranteed.

3.6.2 Details of the remote register

(1) CH□ Digital input value setting (RWwm to RWwm+3)

(a) This is an area for the programmable controller CPU to write the digital input value for D/A conversion.

(b) In the following condition, the digital input values at all channels become "0".
- Remote ready (RX(n+1)B) turns on after power-on.

(c) The settable digital input value is 16-bit signed binary within the setting range according to the output range setting.

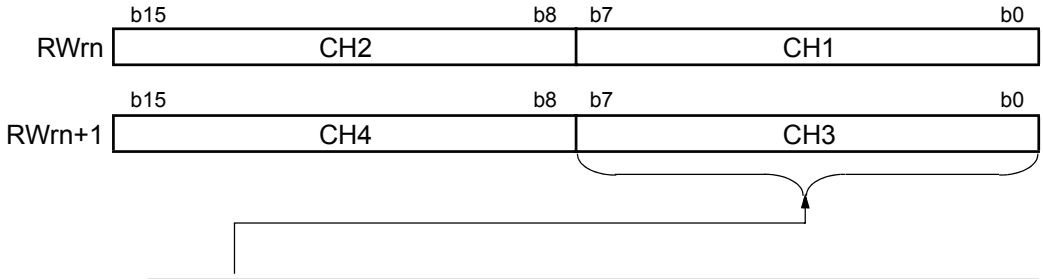
(d) If a set value is outside the setting range, D/A conversion is performed with the data shown in Table 3.11.
Also, the corresponding check code is stored in Check code (RWrn, RWrn+1).

Table 3.11 Settable range of the digital input value

Output range	Settable range	Digital input value when a value is set outside the setting range
-10 to 10V	-16384 to 16383 (Practical range: -16000 to 16000)	16384 or more: 16383 -16385 or less: -16384
0 to 5V	-288 to 12287 (Practical range: 0 to 12000)	12288 or more: 12287 -289 or less: -288
1 to 5V		
0 to 20mA		
4 to 20mA		
User range setting 1 (0 to 20mA)		
User range setting 2 (-10 to 10V)	-12288 to 12287 (Practical range: -12000 to 12000)	12288 or more: 12287 -12289 or less: -12288

(2) CH□ Check code (RWrn, RWrn+1)

(a) This is an area to check if a digital input value is set within the setting range. If a digital input value lower or greater than the setting range is set, any of the following check codes is stored.



Check code	Description
0F$_H$	A digital input value over the setting range was set.
F0$_H$	A digital input value below the setting range was set.
FF$_H$	A digital input value below the setting range and a digital input value over the range were set before error reset request. For example, if writing a digital input value over the setting range, and than, writing a digital input value below the setting range without resetting the check code, a check code of FF$_H$ is stored.

Figure 3.7 List of check codes and storage locations

(b) A check code once stored is not reset even if the setting value becomes within the setting range.

(c) Reset Check code (RWrn, RWrn+1) by turning on Error reset request flag (RY(n+1)A).

(3) Error code (RWrn+2)

(a) If an error occurs (the "RUN" LED flashes) when data are written to the AJ65SBT2B-64DA, the corresponding error code is stored into this area.

(b) For details on error code, refer to Section 6.1.

CHAPTER4 PROCEDURES AND SETTINGS BEFORE OPERATION

4.1 Procedures before Operation

This section describes the procedures for operating the AJ65SBT2B-64DA.

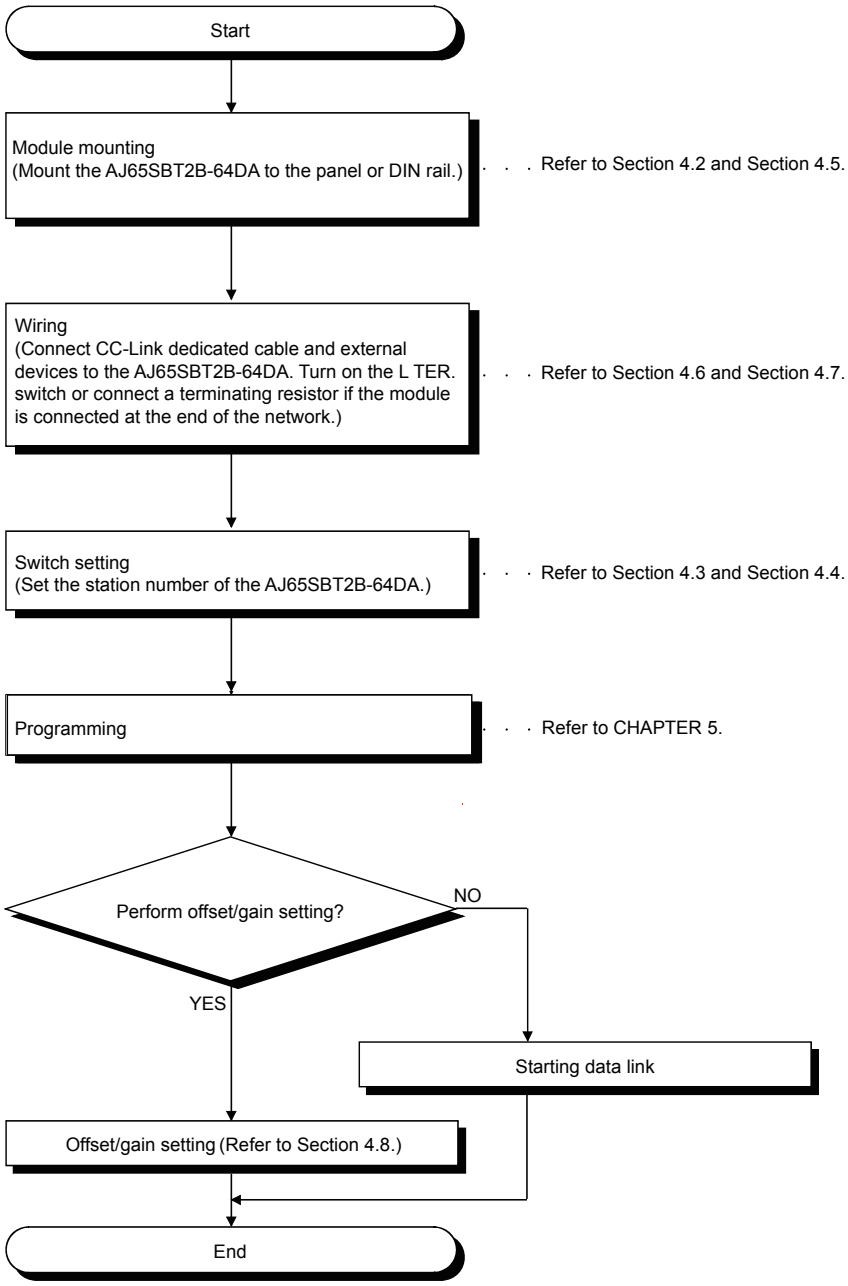

Start
Module mounting
(Mount the AJ65SBT2B-64DA to the panel or DIN rail.)
Refer to Section 4.2 and Section 4.5.
Wiring
(Connect CC-Link dedicated cable and external devices to the AJ65SBT2B-64DA. Turn on the L TER. switch or connect a terminating resistor if the module is connected at the end of the network.)
Refer to Section 4.6 and Section 4.7.
Switch setting
(Set the station number of the AJ65SBT2B-64DA.)
Refer to Section 4.3 and Section 4.4.
Programming
Refer to CHAPTER 5.
Perform offset/gain setting?
NO
YES
Starting data link
Offset/gain setting (Refer to Section 4.8.)
End

Figure 4.1 Procedures before operation

4.2 Handling Precautions

This section describes the precautions for handling the AJ65SBT2B-64DA.

⚠ CAUTION

- Do not touch the terminals while the power is on. Doing so may cause malfunction.
- Take care to prevent foreign matter such as dust or wire chips from entering the module.
  Failure to do so may cause a fire, failure or malfunctions.
- Never disassemble or modify the module.
  This may cause breakdowns, malfunction, injury and/or fire.
- Do not directly touch the conductive area or electronic components of the module.
  Doing so may result in a malfunction or failure of the module.
- Because it is made of resin, do not drop or apply any strong impact to the module. Doing so may damage the module.
- Tighten terminal screws within the specified torque range.
  A loose terminal screw may cause a short circuit or malfunction.
  Overtightening a terminal screw may damage the screw, resulting in a short circuit or malfunction.
- When disposing of this product, treat it as industrial waste.
- Use the module in an environment that meets the general specifications given in this manual.
  Operating it in any other environment may cause an electric shock, fire, malfunction, product damage or deterioration.
- For protection of the switches, do not remove the cushioning material before installation.
- Securely fix the module with the DIN rail or installation screws. Installation screws must be tighten within the specified torque range.
  A loose screw may cause a drop of the module or malfunction.
  Overtightening may damage the screw, resulting in a drop of the module or malfunction.
- Be sure to shut off all phases of the external power supply used by the system before mounting or dismounting the module to or from the panel. Not doing so can cause the module to fail or malfunction.
- Before handling the module, always touch grounded metal, etc. to discharge static electricity from the human body.
  Failure to do so may cause a failure or malfunctions of the module.

(1) Tighten the screws such as module mounting screws and terminal block screws within the following ranges.

Table 4.1 Tightening torque range

Screw location	Tightening torque range
Module mounting screw (M4 screw)	78 to 108N · cm
Terminal block terminal screw (M3 screw)	59 to 88N · cm
Terminal block installation screw (M3.5 screw)	68 to 98N · cm

(2) To prevent defect during transportation, a protective film is attached on the surface of the module. Remove the film before using the module.

(3) When using the DIN rail, pay attention to the followings.

(a) Applicable DIN rail model (IEC 60715 compliant)
TH35-7.5Fe
TH35-7.5Al

(b) DIN rail installation screw pitch
When installing a DIN rail, tighten the screws at a pitch of 200mm (7.87 inches) or less.

(4) When mounting the AJ65SBT2B-64DA to the DIN rail, hold the center of the module and press it until the DIN rail hook at the bottom of the module clicks.

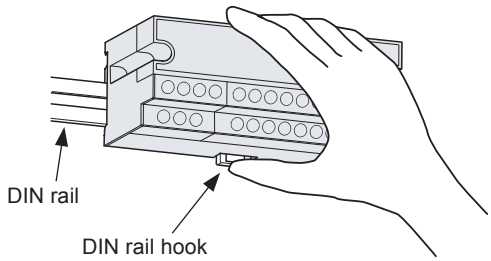


Figure 4.2 Mounting a module to the DIN rail

(5) For the models, specifications, and manufacturers of cables available for the AJ65SBT2B-64DA, refer to the user's manual of the master module used.

4.3 Part Names

This section describes each part name of the AJ65SBT2B-64DA.

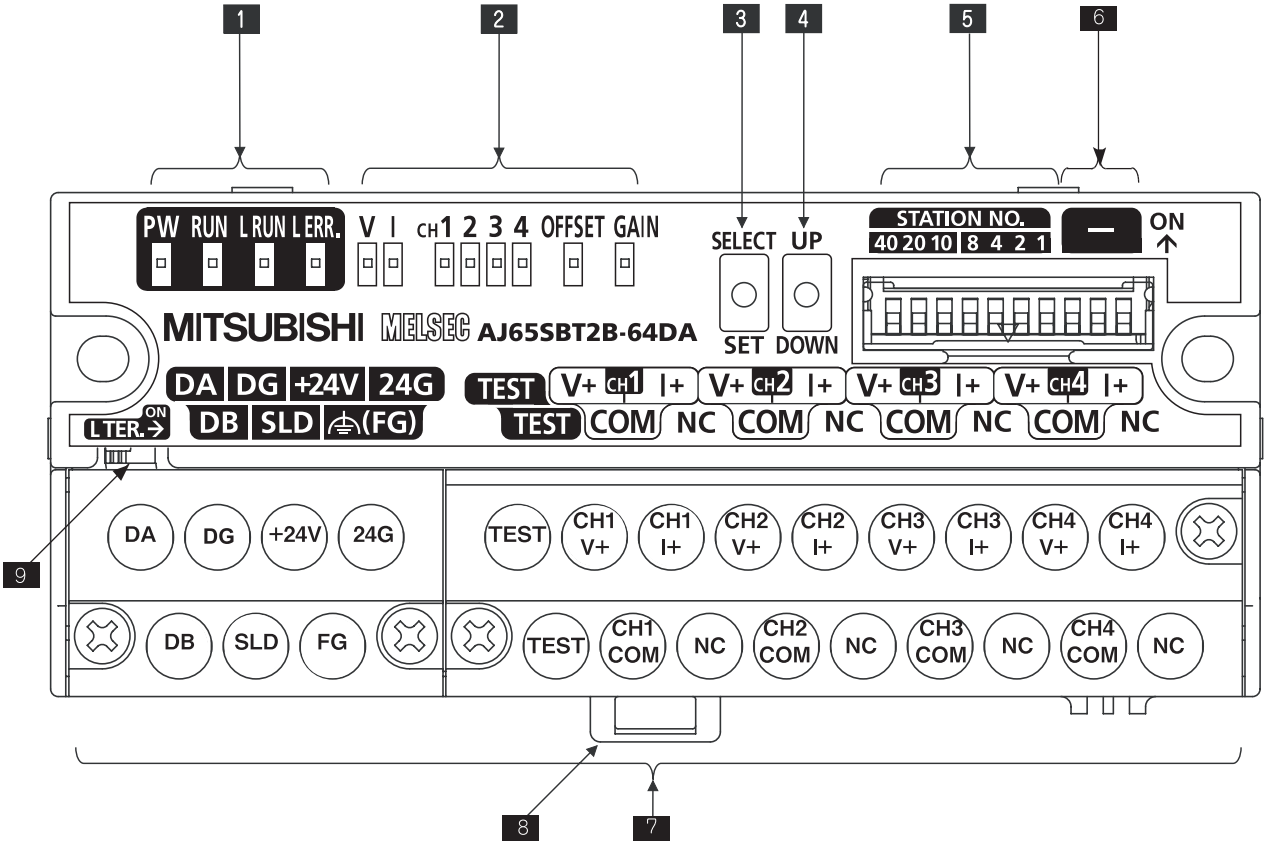


Figure 4.3 Appearance of the AJ65SBT2B-64DA

Table 4.2 Part names

No.	Name	Description		
1	Operating status indication LED	PW LED	On: Power supply on Off: Power supply off	
		RUN LED	Normal mode	On: Normal operation Flashing: 0.1s intervals: Output range setting error 0.5s intervals: Digital input value setting error Off: 24VDC power supply interrupted, watchdog timer error or Flash memory write error
			Test mode	On: The SELECT/SET switch is in the SET position. Flashing: Offset/gain values are outside the setting range. Off: The SELECT/SET switch is in the SELECT or center position.
		L RUN LED	On: Normal communication Off: Communication cutoff (Timeout error)	
		L ERR. LED	On:	Station number is outside the setting range.
			Flashing regularly:	Station number setting has been changed after power-on.
			Flashing irregularly:	Terminating resistor is not connected or the module or CC-Link dedicated cable is affected by noise.
			Off:	Normal communication

Table 4.2 Part names

<table>
<tr><th>No.</th><th>Name</th><th colspan="3">Description</th></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Offset/gain adjusting LED</td><td rowspan="2">V
I
CH□
OFFSET
GAIN</td><td>Normal mode</td><td>Normally off</td></tr>
<tr><td>Test mode</td><td>Every time the SELECT/SET switch is moved to the "SELECT" position, the LED status changes. (Refer to Section 4.8.)</td></tr>
<tr><td>3</td><td>SELECT/SET switch</td><td colspan="3">Performs offset/gain setting in test mode.</td></tr>
<tr><td>4</td><td>UP/DOWN switch</td><td colspan="3">Adjusts the offset/gain values of the channel specified by the SELECT/SET switch.</td></tr>
<tr><td>5</td><td>Station number setting switch</td><td colspan="3">Sets the tens place of station number using the switches, STATION NO. "10", "20", and "40".
Sets the ones place of station number using the switches, STATION NO. "1", "2", "4", and "8".
All switches are set to "off" at the factory.
Set the station number within the range 1 to 64.
If not, an error occurs and the "L ERR." LED flashes.
Station number setting should not be overlapped.

<table>
<tr><th rowspan="2">Station number</th><th colspan="3">Tens place</th><th colspan="4">Ones place</th></tr>
<tr><th>40</th><th>20</th><th>10</th><th>8</th><th>4</th><th>2</th><th>1</th></tr>
<tr><td>1</td><td>Off</td><td>Off</td><td>Off</td><td>Off</td><td>Off</td><td>Off</td><td>On</td></tr>
<tr><td>2</td><td>Off</td><td>Off</td><td>Off</td><td>Off</td><td>Off</td><td>On</td><td>Off</td></tr>
<tr><td>3</td><td>Off</td><td>Off</td><td>Off</td><td>Off</td><td>Off</td><td>On</td><td>On</td></tr>
<tr><td>4</td><td>Off</td><td>Off</td><td>Off</td><td>Off</td><td>On</td><td>Off</td><td>Off</td></tr>
<tr><td>⋮</td><td>⋮</td><td>⋮</td><td>⋮</td><td>⋮</td><td>⋮</td><td>⋮</td><td>⋮</td></tr>
<tr><td>10</td><td>Off</td><td>Off</td><td>On</td><td>Off</td><td>Off</td><td>Off</td><td>Off</td></tr>
<tr><td>11</td><td>Off</td><td>Off</td><td>On</td><td>Off</td><td>Off</td><td>Off</td><td>On</td></tr>
<tr><td>⋮</td><td>⋮</td><td>⋮</td><td>⋮</td><td>⋮</td><td>⋮</td><td>⋮</td><td>⋮</td></tr>
<tr><td>64</td><td>On</td><td>On</td><td>Off</td><td>Off</td><td>On</td><td>Off</td><td>Off</td></tr>
</table>
(Example) For the station number "32", set the switches as shown below.
<table>
<tr><th rowspan="2">Station number</th><th colspan="3">Tens place</th><th colspan="4">Ones place</th></tr>
<tr><th>40</th><th>20</th><th>10</th><th>8</th><th>4</th><th>2</th><th>1</th></tr>
<tr><td>32</td><td>Off</td><td>On</td><td>On</td><td>Off</td><td>Off</td><td>On</td><td>Off</td></tr>
</table></td></tr>
<tr><td>6</td><td>Reserved</td><td colspan="3">(Set all switches to off.)</td></tr>
<tr><td>7</td><td>Terminal block</td><td colspan="3">Used to connect the module power supply, transmission, and I/O signals.</td></tr>
<tr><td>8</td><td>DIN rail hook</td><td colspan="3">Used to mount the module to the DIN rail.</td></tr>
<tr><td>9</td><td>L TER (Line Termination) switch</td><td colspan="3">Turned on to enable the terminating resistor built in the AS65SBT2B-64DA.
Used when the AJ65SBT2B-64DA is connected at the end of the network.</td></tr>
</table>

4.3.1 Transmission speed auto-tracking function

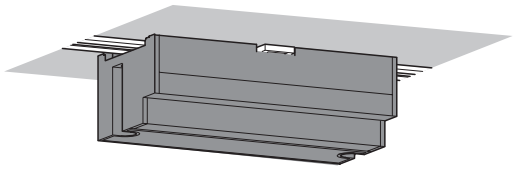
Transmission speed is set automatically according to the setting in the master module.

4.4 Station Number Setting

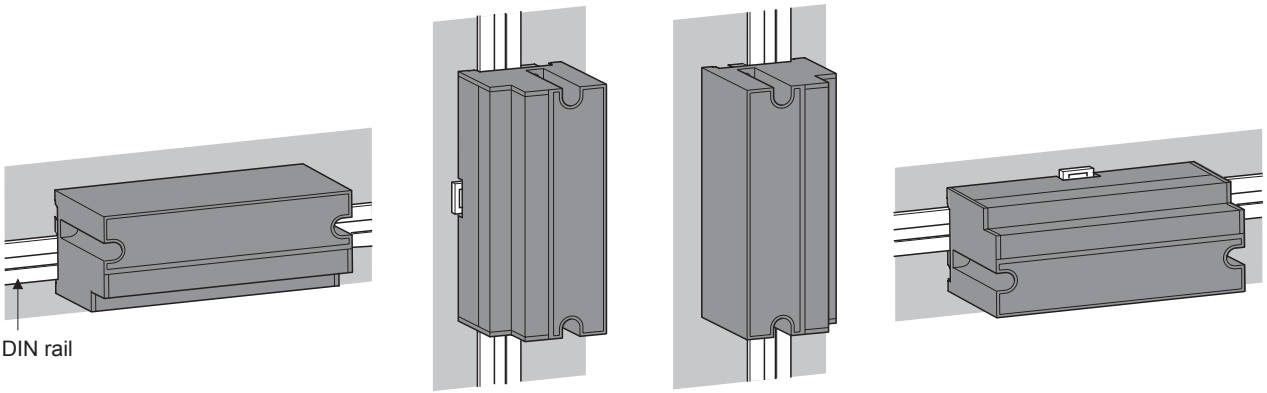
The buffer memory addresses of the master module, where the remote I/O signals and read/write data are stored, are determined by the station number setting of the AJ65SBT2B-64DA.
For details, refer to the user's manual of the master module used.

4.5 Module Mounting Orientation

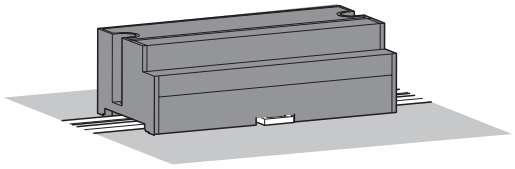
The AJ65SBT2B-64DA can be mounted in six different orientations.
(There are no restrictions on the mounting orientation.)
The module can also be mounted to a DIN rail.



Ceiling mounting



Front mounting



Flat surface mounting

Figure 4.4 Module mounting orientation

4.6 Wiring of Data Link Cable

This section describes the wiring of CC-Link dedicated cables for connecting the AJ65SBT2B-64DA to the CC-Link system.

4.6.1 Wiring precautions

When replacing existing AJ65SBT-62DA with the AJ65SBT2B-64DA, rewire the module using communication terminal block dedicated for the AJ65SBT2B-64DA.

4.6.2 CC-Link dedicated cable connection

The following shows a connection example of CC-Link dedicated cables for the AJ65SBT2B-64DA.

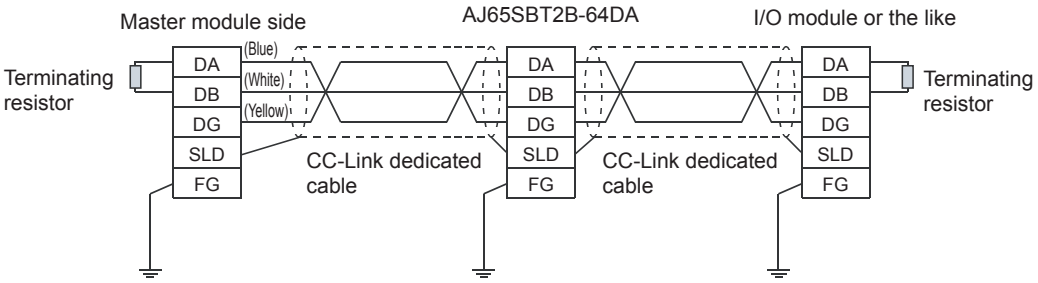


Figure 4.5 CC-Link dedicated cable connection

4.6.3 Terminating resistor connection

The AJ65SBT2B-64DA has a built-in terminating resister of 110Ω. Therefore, there is no need to connect a terminating resister externally.

(1) Precautions

(a) Move the L TER. switch until it clicks.

(b) Make sure that between DA and DB is high resistance (when the L TER. switch is off) or is 110Ω (when the L TER. switch is on) with a tester before wiring the system with CC-Link dedicated cables.

(c) The built-in terminating resistor cannot be used in the following cases. Connect a terminating resistor (110 or 130Ω).

- A CC-Link system is configured using CC-Link dedicated cables of 130Ω.
- The AJ65SBT2B-64DA may be replaced during data link.

4.7 Wiring with External Devices

This section describes the precautions for wiring the AJ65SBT2B-64DA and its wiring with external devices.

4.7.1 Wiring precautions

External wiring that is less susceptible to noise is required as a condition of enabling a highly reliable system and making full use of the capabilities of AJ65SBT2B-64DA.
The precautions when performing external wiring are described below.

(a) Use separate cables for the AC control circuit and the external output signals of the AJ65SBT2B-64DA or the external power supply to avoid the influence of the AC side surges and induction.

(b) Do not mount the cables close to or bundle them with the main circuit line, a high-voltage cable or a load cable from other than the programmable controller.
Not doing so will cause the module more susceptible to noises, surges, and inductions.

(c) The shield wire or the shielded cable must be grounded at one end.

4.7.2 Wiring with external devices

(1) For voltage output

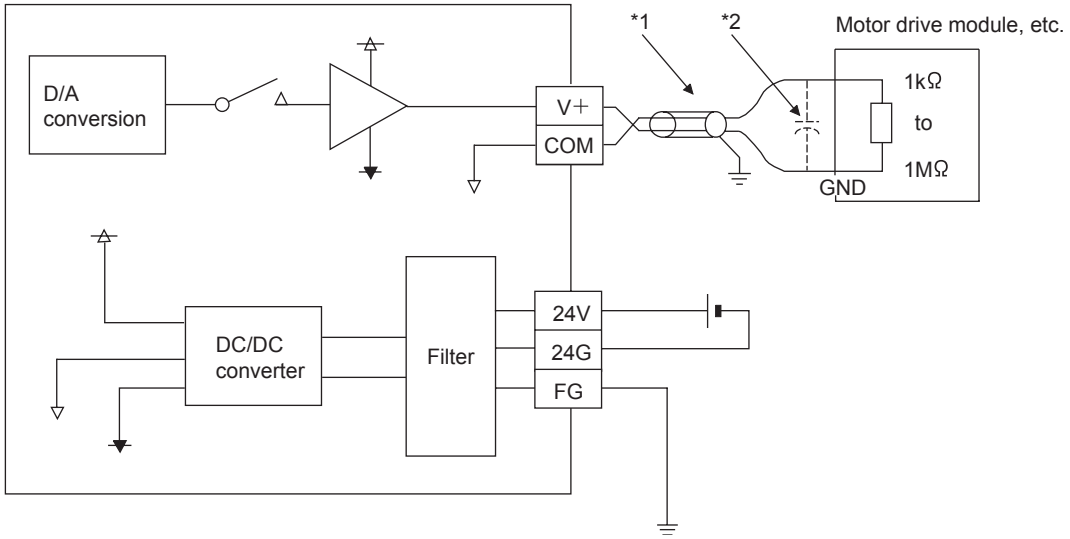


Figure 4.6 Wiring for voltage output

* 1 For wiring, use shielded twisted pair cables.
* 2 If there is noise or ripples in the external wiring, connect a 0.1 to 0.47μF capacitor (25V or higher voltage-resistant product) to the input terminals of the external device.

(2) For current output

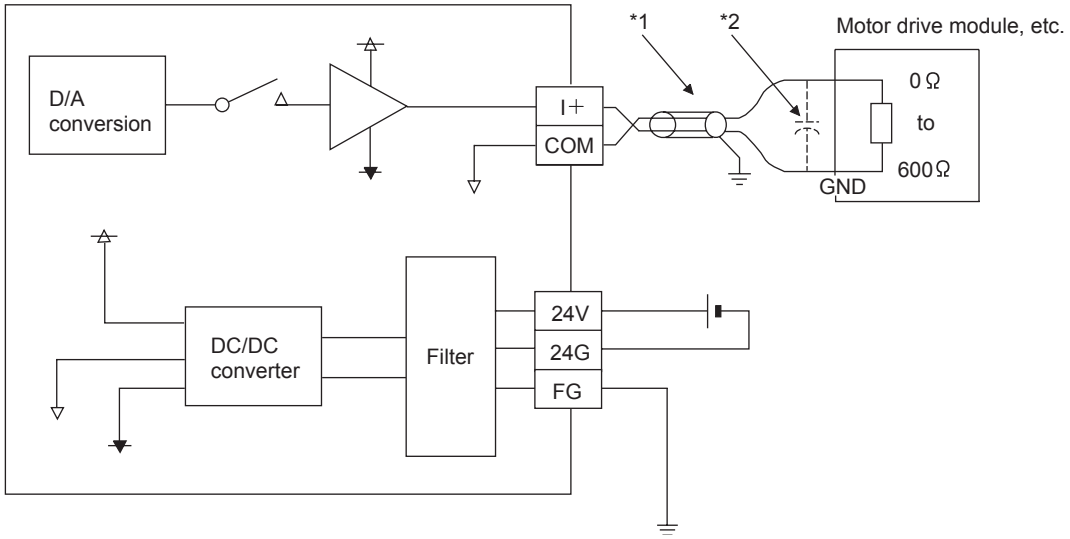


Figure 4.7 Wiring for current output

* 1 For wiring, use shielded twisted pair cables.
* 2 If there is noise or ripples in the external wiring, connect a 0.1 to 0.47μF capacitor (25V or higher voltage-resistant product) to the input terminals of the external device.

4.8 Offset/Gain Setting

To change the I/O conversion characteristics, follow the procedure below.

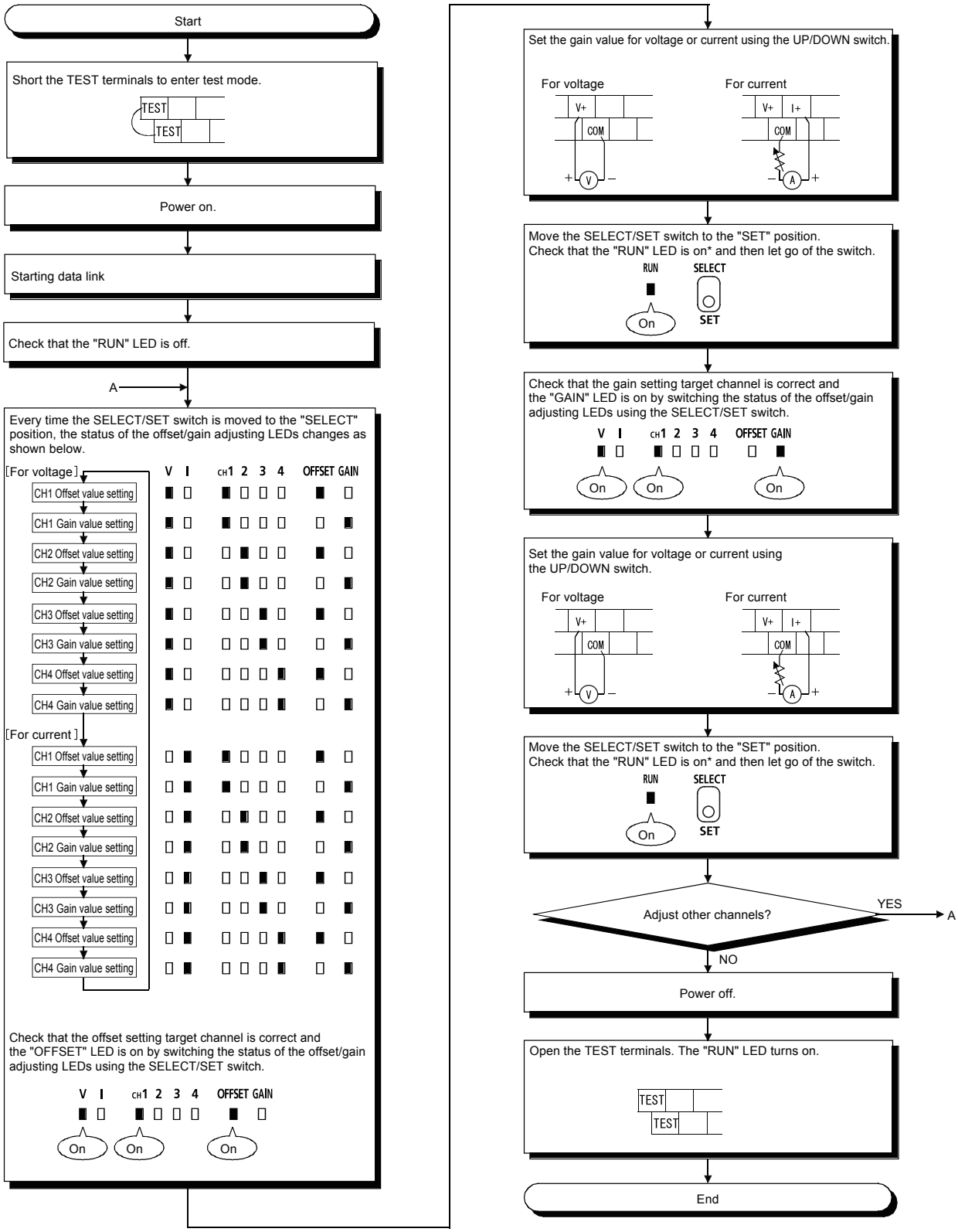

Start
Short the TEST terminals to enter test mode.
TEST
TEST
Power on.
Starting data link
Check that the "RUN" LED is off.
A
Every time the SELECT/SET switch is moved to the "SELECT" position, the status of the offset/gain adjusting LEDs changes as shown below.
[For voltage]
V I CH1 2 3 4 OFFSET GAIN
CH1 Offset value setting
CH1 Gain value setting
CH2 Offset value setting
CH2 Gain value setting
CH3 Offset value setting
CH3 Gain value setting
CH4 Offset value setting
CH4 Gain value setting
[For current]
CH1 Offset value setting
CH1 Gain value setting
CH2 Offset value setting
CH2 Gain value setting
CH3 Offset value setting
CH3 Gain value setting
CH4 Offset value setting
CH4 Gain value setting
Check that the offset setting target channel is correct and the "OFFSET" LED is on by switching the status of the offset/gain adjusting LEDs using the SELECT/SET switch.
V I CH1 2 3 4 OFFSET GAIN
On
On
On
Set the gain value for voltage or current using the UP/DOWN switch.
For voltage
For current
V+
I+
COM
V
A
Move the SELECT/SET switch to the "SET" position.
Check that the "RUN" LED is on* and then let go of the switch.
RUN
SELECT
SET
On
Check that the gain setting target channel is correct and the "GAIN" LED is on by switching the status of the offset/gain adjusting LEDs using the SELECT/SET switch.
V I CH1 2 3 4 OFFSET GAIN
On
On
On
Set the gain value for voltage or current using the UP/DOWN switch.
For voltage
For current
Move the SELECT/SET switch to the "SET" position.
Check that the "RUN" LED is on* and then let go of the switch.
Adjust other channels?
YES
A
NO
Power off.
Open the TEST terminals. The "RUN" LED turns on.
End

Figure 4.8 Offset/gain setting procedure

* : If the "RUN" LED does not turn on, Flash memory may have failed.
For details, refer to Section 3.5.2.

POINT

(1) Set the offset/gain values in the actual operating status.
(2) The offset/gain values are stored in the Flash memory of the AJ65SBT2B-64DA and not cleared even at power-off.
(3) If initial setting is executed in test mode, which is the mode after shorting the TEST terminals, D/A conversion is performed on all channels. During offset/gain setting, use Test mode flag (RXnF) as an interlock.
(4) Set the offset/gain values within the range described in POINT of Section 3.3.1 and Section 3.3.2. If the values are outside the setting range, the maximum resolution and accuracy may exceed the performance specifications range.

4.9 Maintenance and Inspection

There are no special inspection items for the AJ65SBT2B-64DA. To keep the system in the best condition, however, perform inspection following the items described in the user's manual of the programmable controller CPU.

CHAPTER5 PROGRAMMING

This chapter describes the programming procedure, basic programs for reading/writing data, and program examples for the AJ65SBT2B-64DA.
When applying any of the program examples introduced in this chapter to the actual system, make sure to examine the applicability and confirm that no problems will occur in the system control.
For the master module, refer to the user's manual of the master module used. For the remote register, refer to Section 3.6. For the details on the dedicated instructions, refer to the Type AnSHCPU/AnACPU/AnUCPU/QCPU-A (A Mode) Programming Manual (Dedicated Instructions).

5.1 Programming Procedure

Create programs for performing D/A conversion in the AJ65SBT2B-64DA in the following procedure.

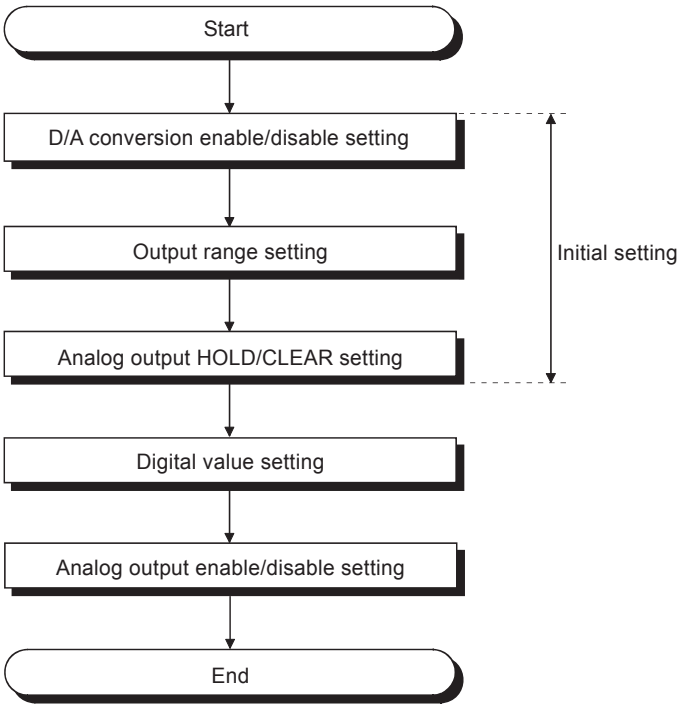


Figure 5.1 Programming procedure

5.2 Conditions of Program Examples

The program examples in this chapter are created under the following conditions.

(1) Conditions of the AJ65SBT2B-64DA

- Channels to be used: CH1 and CH2
- Output range: -10 to 10V for CH1, 0 to 5V for CH2
- When an error occurs, the module outputs the corresponding error code in BCD and resets the error.
- When an error occurs, the module holds the output status for both CH1 and CH2.

(2) System configuration

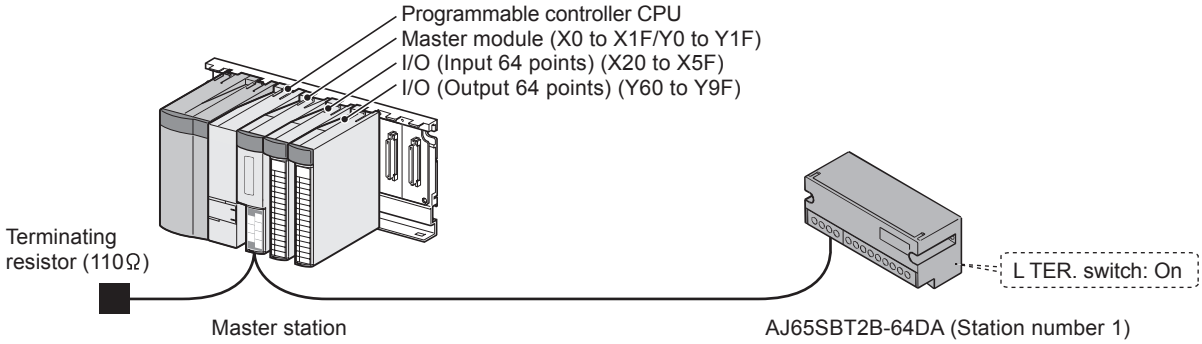

Programmable controller CPU
Master module (X0 to X1F/Y0 to Y1F)
I/O (Input 64 points) (X20 to X5F)
I/O (Output 64 points) (Y60 to Y9F)
Terminating resistor (110Ω)
L TER. switch: On
Master station
AJ65SBT2B-64DA (Station number 1)

Figure 5.2 System configuration and wiring diagram

(3) Relationship between programmable controller CPU, master module, and AJ65SBT2B-64DA

(a) When the QCPU (Q mode) or QnACPU is used

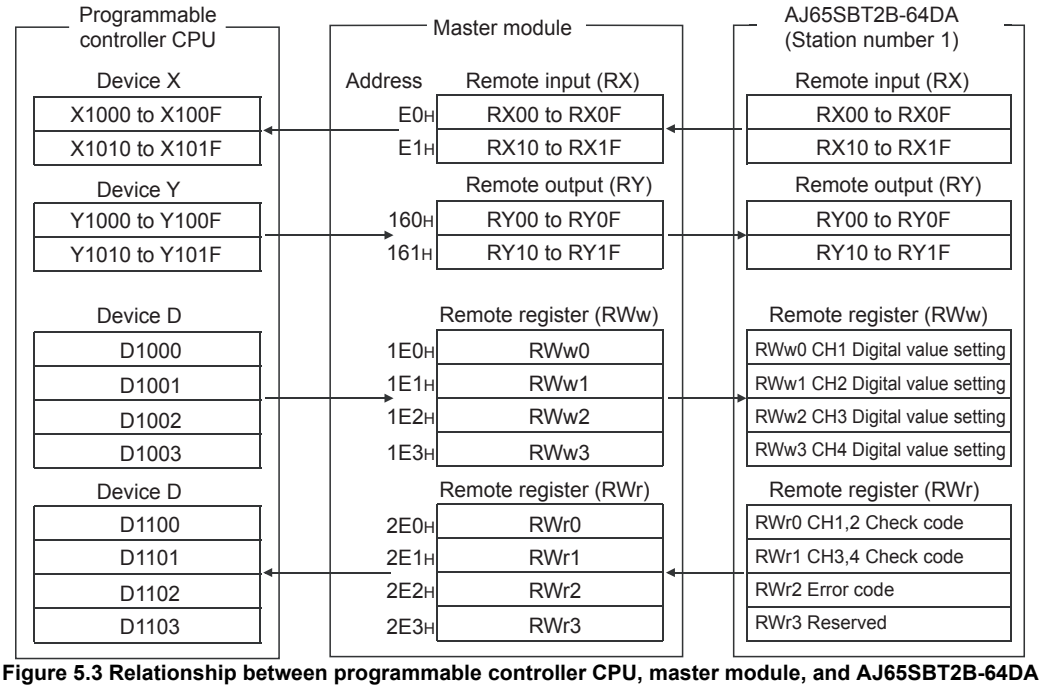


Figure 5.3 Relationship between programmable controller CPU, master module, and AJ65SBT2B-64DA (when the QCPU (Q mode) or QnACPU is used)

(b) When the ACPU/QCPU (A mode) is used

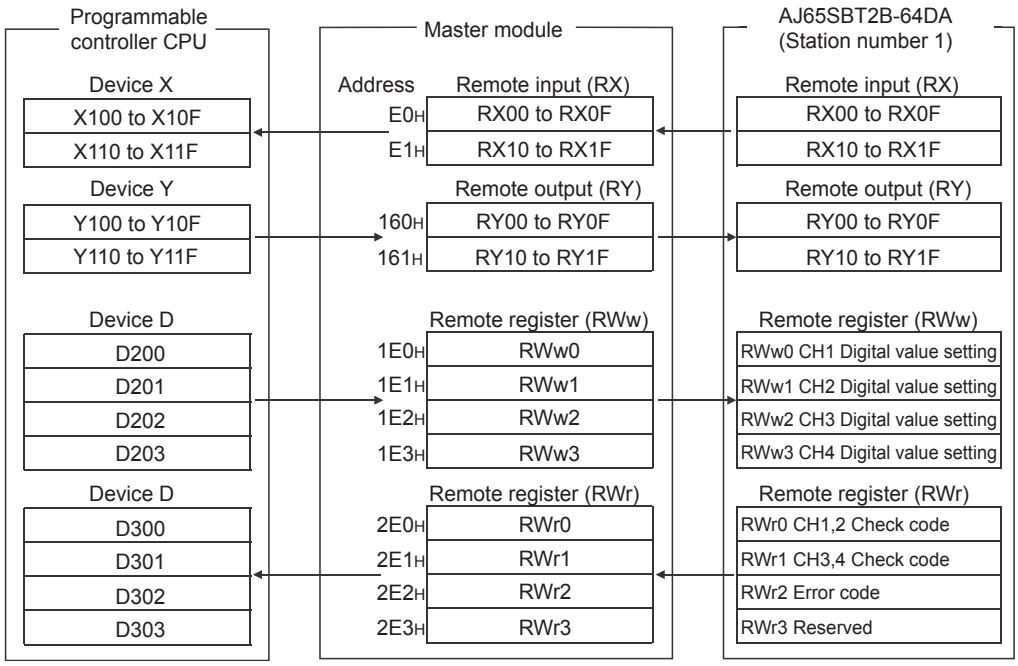


Figure 5.4 Relationship between programmable controller CPU, master module, and AJ65SBT2B-64DA (When the ACPU/QCPU (A mode) is used)

* : In the program example (refer to Section 5.5) that uses the RRPA instruction (auto refresh parameter setting) in the ACPU/QCPU (A mode), RWr0 to RWr3 are assigned to D456 to D459.

POINT

Devices used in the program examples described in this chapter may not be used depending on the CPU module.
For the available device setting range, refer to the user's manual of the CPU module used.
For example, when the A1SCPU is used, devices X100, Y100 and later cannot be used. Use devices such as B or M.

5.3 Program Example When the QCPU (Q mode) is Used

Parameters are set in Network parameter using GX Developer.
Initial setting of the AS65SBT2B-64DA cannot be performed using the remote device station initialization procedure registration function.

(1) Parameter setting

(a) Network parameter setting

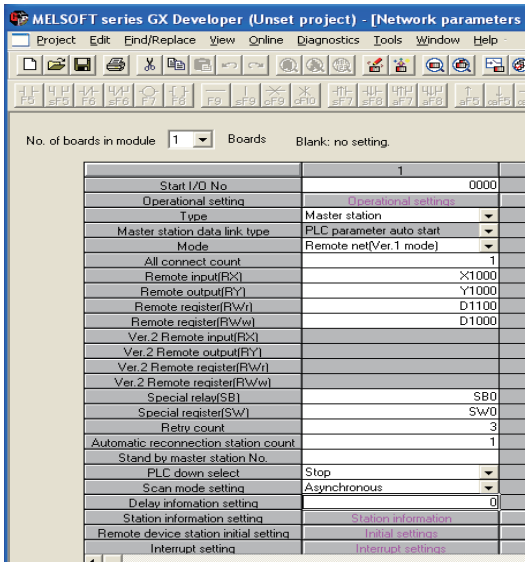

MELSOFT series GX Developer (Unset project) - [Network parameters
Project Edit Find/Replace View Online Diagnostics Tools Window Help
No. of boards in module 1 Boards Blank: no setting.
1
Start I/O No 0000
Operational setting Operational settings
Type Master station
Master station data link type PLC parameter auto start
Mode Remote net(Ver.1 mode)
All connect count 1
Remote input(RX) X1000
Remote output(RY) Y1000
Remote register(RWr) D1100
Remote register(RWw) D1000
Ver.2 Remote input(RX)
Ver.2 Remote output(RY)
Ver.2 Remote register(RWr)
Ver.2 Remote register(RWw)
Special relay(SB) SB0
Special register(SW) SW0
Retry count 3
Automatic reconnection station count 1
Stand by master station No.
PLC down select Stop
Scan mode setting Asynchronous
Delay infomation setting 0
Station information setting Station information
Remote device station initial setting Initial settings
Interrupt setting Interrupt settings

Figure 5.5 Network parameter setting screen for CC-Link (when the QCPU (Q mode) is used)

Table 5.1 Setting items on the Network parameter setting screen for CC-Link (when the QCPU (Q mode) is used)

Setting item	Setting value
No. of boards in module	1 (Boards)
Start I/O No	0000
Type	Master station
Mode	Remote net[Ver.1 mode]
All connect count	1 (module)
Remote input[RX]	X1000
Remote output[RY]	Y1000
Remote register[RWr]	D1100
Remote register[RWw]	D1000
Special relay[SB]	SB0
Special register[SW]	SW0
Station information setting	Refer to (1)(b) in this section.

(b) Station information setting

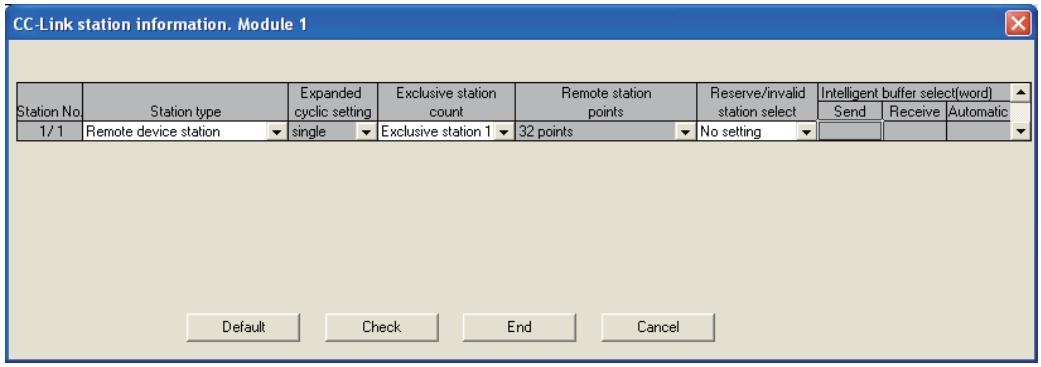


Figure 5.6 CC-Link station information. Module 1 screen (when the QCPU (Q mode) is used)

Table 5.2 Setting items on the CC-Link station information. Module 1 screen (when the QCPU (Q mode) is used)

Setting item	Setting value
Station type	Remote device station
Exclusive station count	Exclusive station 1
Reserve/invalid station select	No setting

(2) List of devices used in the program example

Table 5.3 List of devices used in the program example (when the QCPU (Q mode) is used)

Device	Description
X0	Module error
X1	Host station data link status
XF	Module ready
X20	Signal that is turned on to write the digital input value to CH1 Digital input value setting (RWw0) or CH2 Digital input value setting (RWw1) of the AJ65SBT2B-64DA
X21	Signal that is turned on to output the analog value from CH1 or CH2
X22	Signal that is turned on to reset an error
X23	Signal that is turned on to change the initial setting
X1018	Initial data processing request flag
X1019	Initial data setting completion flag
X101A	Error flag
X101B	Remote ready
Y60	Signal that is output when a data link error occurs
Y70 to Y72	Signal that is output an error code in BCD
Y1000 to Y101A	Signal for settings of the AJ65SBT2B-64DA
M0	Signal that stores the data link status of the AJ65SBT2B-64DA 0 (Off): Data link normal 1 (On): Data link error
M100	Master control contact
D1000	CH1 Digital input value setting
D1001	CH2 Digital input value setting
D1102	Error code
SW80	Other station data link status

(3) Program example

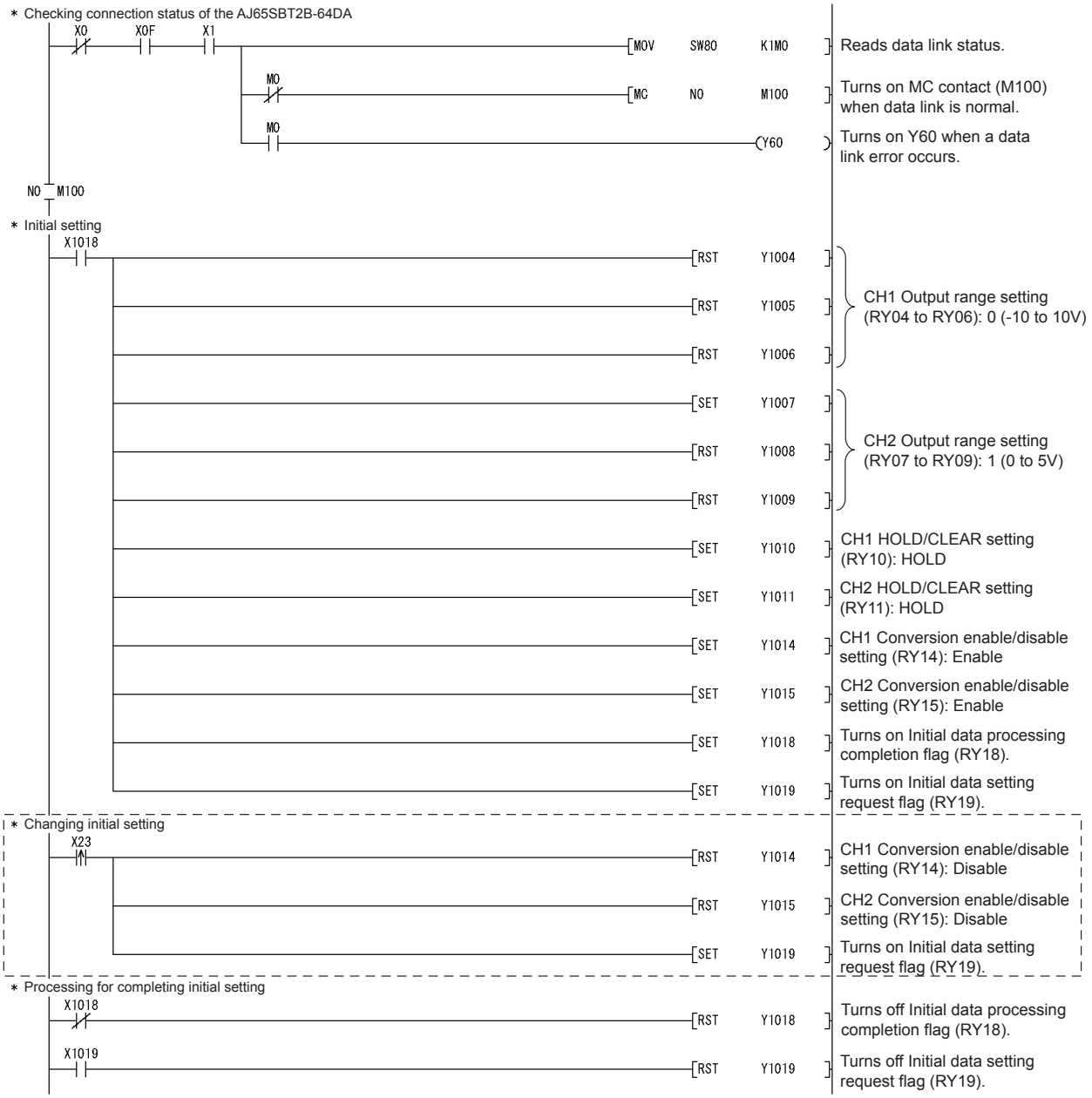


Figure 5.7 Program example (when the QCPU (Q mode) is used) 1/2

* 1: The program in the dotted area is required only when the initial setting is changed.

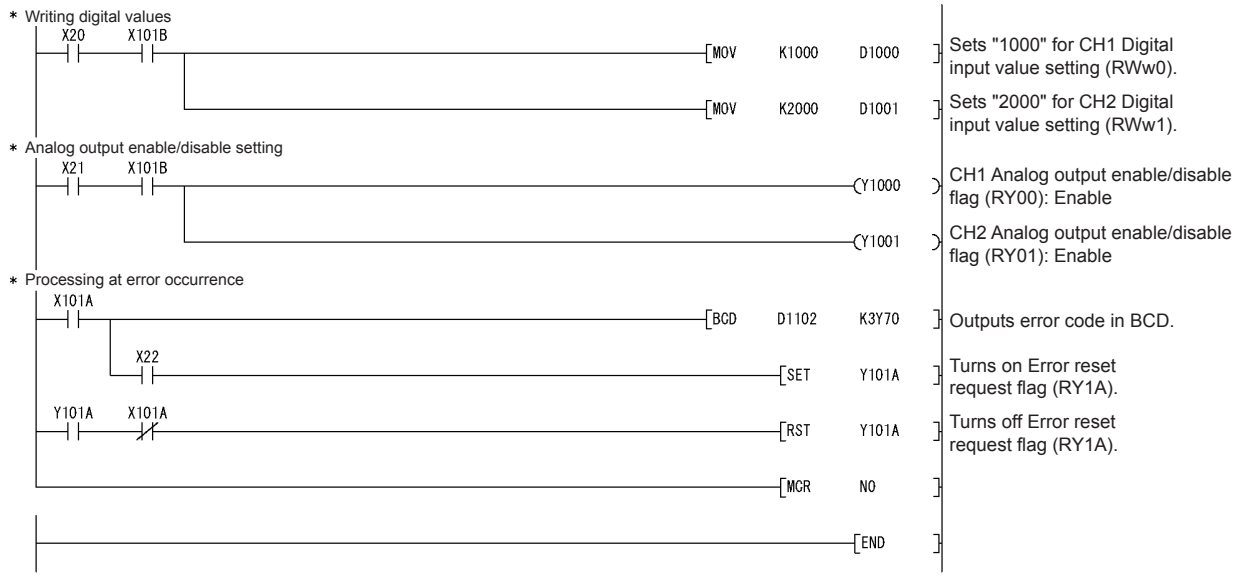


Figure 5.8 Program example (when the QCPU (Q mode) is used) 2/2

5.4 Program Example When the QnACPU is Used

Parameters are set in Network parameter using GX Developer.

(1) Parameter setting

(a) Network parameter setting

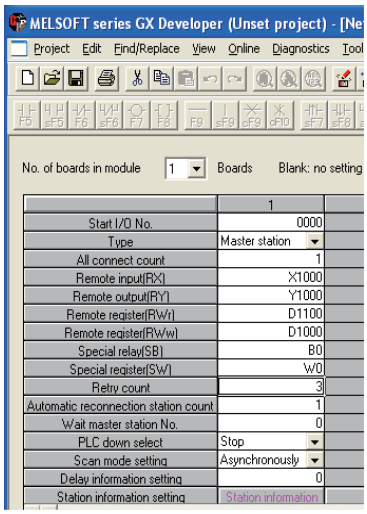

MELSOFT series GX Developer (Unset project) - [Ne
Project Edit Find/Replace View Online Diagnostics Tool
No. of boards in module 1 Boards Blank: no setting
1
Start I/O No. 0000
Type Master station
All connect count 1
Remote input[RX] X1000
Remote output[RY] Y1000
Remote register[RWr] D1100
Remote register[RWw] D1000
Special relay[SB] B0
Special register[SW] W0
Retry count 3
Automatic reconnection station count 1
Wait master station No. 0
PLC down select Stop
Scan mode setting Asynchronously
Delay information setting 0
Station information setting Station information

Figure 5.9 Network parameter setting screen for CC-Link (when the QnACPU is used)

Table 5.4 Setting items on the Network parameter setting screen for CC-Link (when the QnACPU is used)

Setting item	Setting value
No. of boards in module	1 (Boards)
Start I/O No	0000
Type	Master station
All connect count	1 (module)
Remote input[RX]	X1000
Remote output[RY]	Y1000
Remote register[RWr]	D1100
Remote register[RWw]	D1000
Special relay[SB]	B0
Special register[SW]	W0
Station information setting	Refer to (1)(b) in this section.

(b) Station information setting

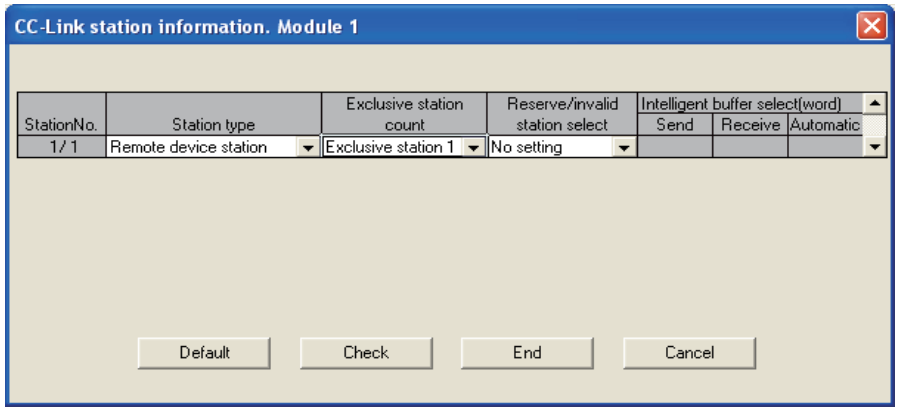


Figure 5.10 CC-Link station information. Module 1 screen (when the QnACPU is used)

Table 5.5 Setting items on the CC-Link station information. Module 1 screen (when the QnACPU is used)

Setting item	Setting value
Station type	Remote device station
Exclusive station count	Exclusive station 1
Reserve/invalid station select	No setting

POINT

When using the QnACPU, using "Y" as the remote output (RY) refresh device of the auto refresh parameter may not hold the analog value even in HOLD setting. In HOLD setting, use "M" or "B" as the remote output (RY) refresh device.

(2) List of devices used in the program example

Table 5.6 List of devices used in the program example (when the QnACPU is used)

Device	Description
X0	Module error
X1	Host station data link status
XF	Module ready
X20	Signal that is turned on to write the digital input value to CH1 Digital input value setting (RWw0) or CH2 Digital input value setting (RWw1) of the AJ65SBT2B-64DA
X21	Signal that is turned on to output the analog value from CH1 or CH2
X22	Signal that is turned on to reset an error
X23	Signal that is turned on to change the initial setting
X1018	Initial data processing request flag
X1019	Initial data setting completion flag
X101A	Error flag
X101B	Remote ready
Y60	Signal that is output when a data link error occurs
Y70 to Y72	Signal that is output an error code in BCD
Y1000 to Y101A	Signal for settings of the AJ65SBT2B-64DA
M0	Signal that stores the data link status of the AJ65SBT2B-64DA 0 (Off): Data link normal 1 (On): Data link error
M100	Master control contact
D1000	CH1 Digital input value setting
D1001	CH2 Digital input value setting
D1102	Error code
W80	Other station data link status

(3) Program example

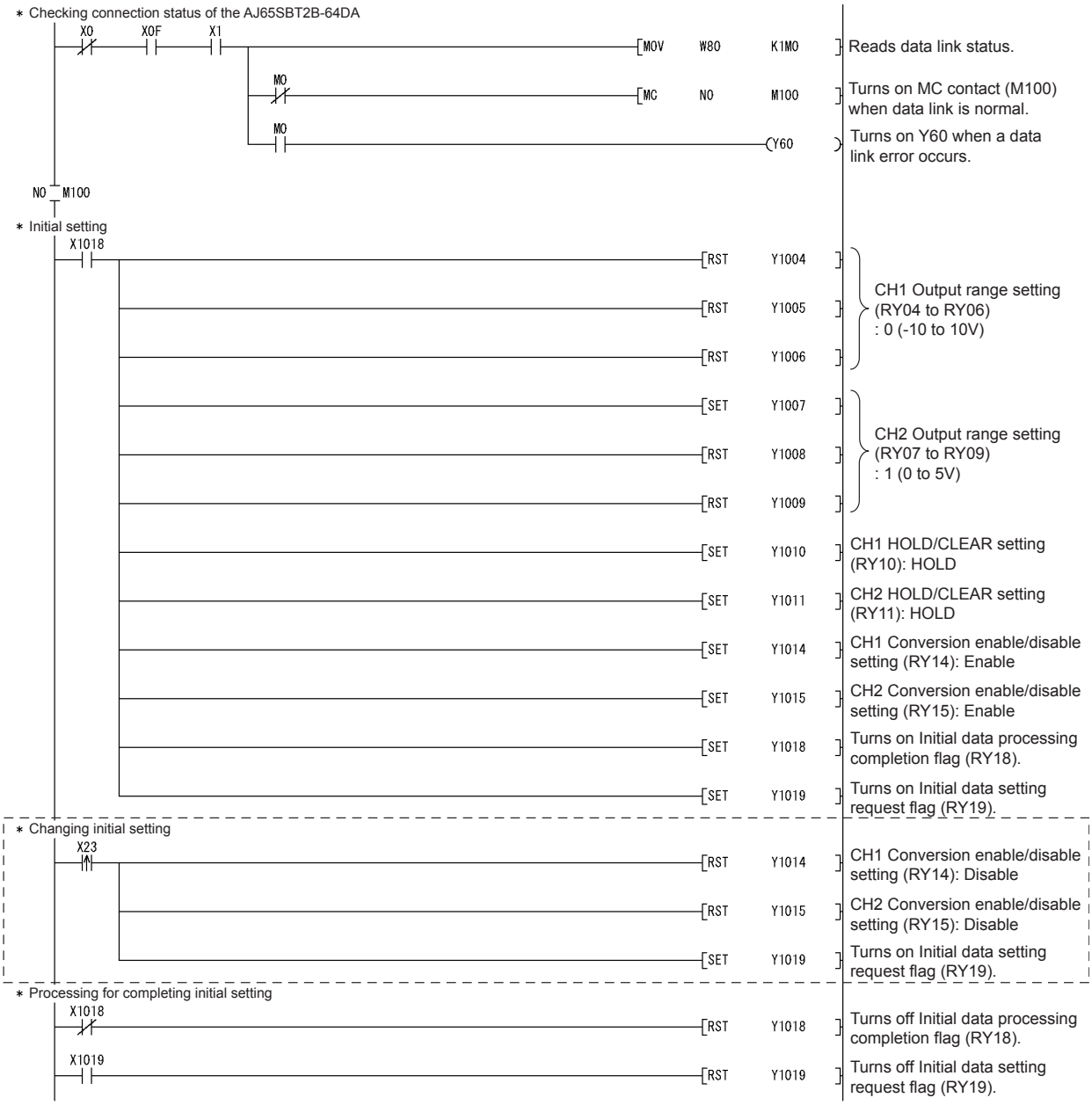


Figure 5.11 Program example (when the QnACPU is used) 1/2

* 1: The program in the dotted area is required only when the initial setting is changed.

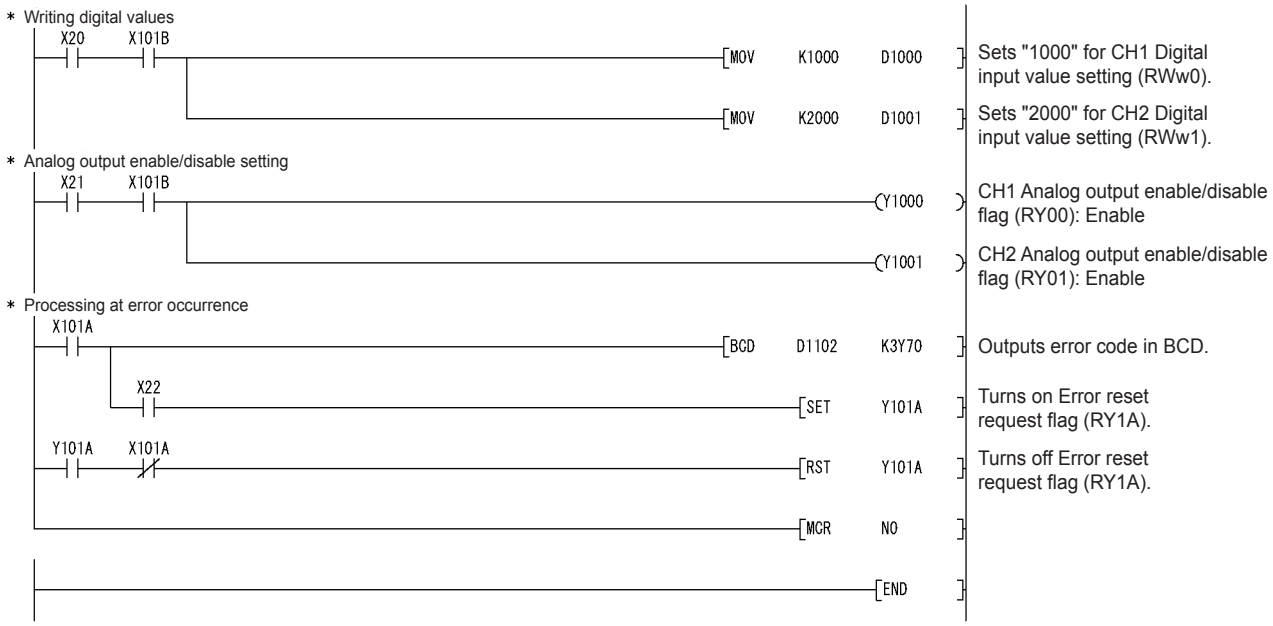


Figure 5.12 Program example (when the QnACPU is used) 2/2

5.5 Program Example When the ACPU/QCPU (A mode) is Used (Dedicated Instructions)

Parameters are set in the sequence program.

(1) List of devices used in the program example

Table 5.7 List of devices used in the program example (when the ACPU/QCPU (A mode) is used (dedicated instructions))

Device	Description
X0	Module error
X1	Host station data link status
XF	Module ready
X20	Signal that is turned on to write the digital input value to CH1 Digital input value setting (RWw0) or CH2 Digital input value setting (RWw1) of the AJ65SBT2B-64DA
X21	Signal that is turned on to output the analog value from CH1 or CH2
X22	Signal that is turned on to reset an error
X23	Signal that is turned on to change the initial setting
X118	Initial data processing request flag
X119	Initial data setting completion flag
X11A	Error flag
X11B	Remote ready
Y60	Signal that is output when a data link error occurs
Y70 to Y72	Signal that is output an error code in BCD
Y100 to Y11A	Signal for settings of the AJ65SBT2B-64DA
M0	Signal that stores the data link status of the AJ65SBT2B-64DA 0 (Off): Data link normal 1 (On): Data link error
M10	Network parameter setting start pulse signal
M11	Signal that is turned on when parameter setting is completed normally
M12	Signal that is turned on when parameter setting is completed in error
M13	Auto refresh parameter setting start pulse signal
M20	Initial setting change command pulse
M100	Master control contact
D0 to D2	Device for Network parameter setting
D3	Device that stores host station parameter status when the instruction is completed in error
D100 to D119	Device for auto refresh parameter setting
D200	CH1 Digital input value setting
D201	CH2 Digital input value setting
D458	Error code
W80	Other station data link status

(2) Program example

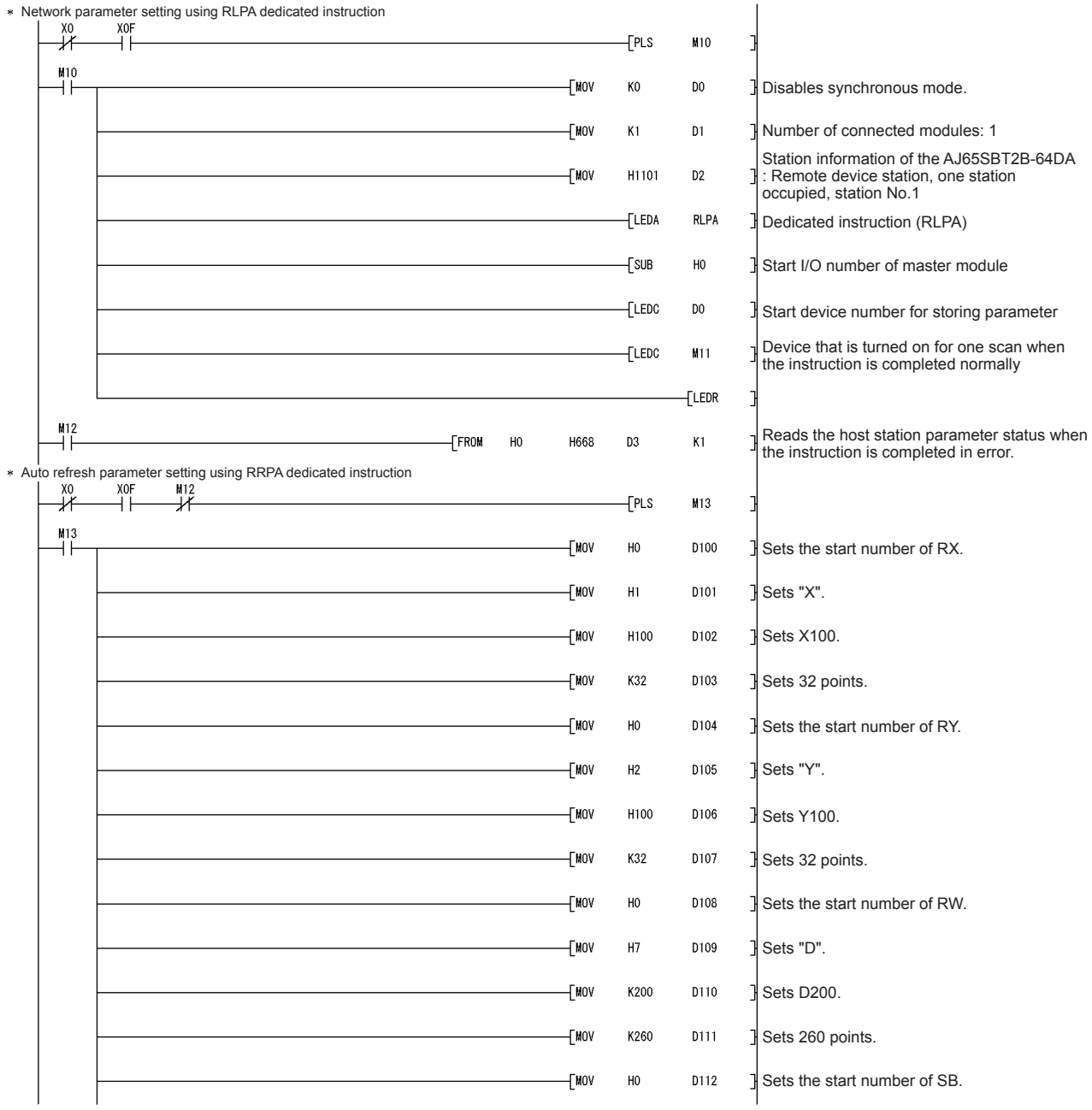

* Network parameter setting using RLPA dedicated instruction
X0 X0F PLS M10
M10 MOV K0 D0 Disables synchronous mode.
MOV K1 D1 Number of connected modules: 1
MOV H1101 D2 Station information of the AJ65SBT2B-64DA : Remote device station, one station occupied, station No.1
LEDA RLPA Dedicated instruction (RLPA)
SUB H0 Start I/O number of master module
LEDC D0 Start device number for storing parameter
LEDC M11 Device that is turned on for one scan when the instruction is completed normally
LEDR
M12 FROM H0 H668 D3 K1 Reads the host station parameter status when the instruction is completed in error.
* Auto refresh parameter setting using RRPA dedicated instruction
X0 X0F M12 PLS M13
M13 MOV H0 D100 Sets the start number of RX.
MOV H1 D101 Sets "X".
MOV H100 D102 Sets X100.
MOV K32 D103 Sets 32 points.
MOV H0 D104 Sets the start number of RY.
MOV H2 D105 Sets "Y".
MOV H100 D106 Sets Y100.
MOV K32 D107 Sets 32 points.
MOV H0 D108 Sets the start number of RW.
MOV H7 D109 Sets "D".
MOV K200 D110 Sets D200.
MOV K260 D111 Sets 260 points.
MOV H0 D112 Sets the start number of SB.

Figure 5.13 Program example (when the ACPU/QCPU (A mode) is used (dedicated instructions)) 1/3

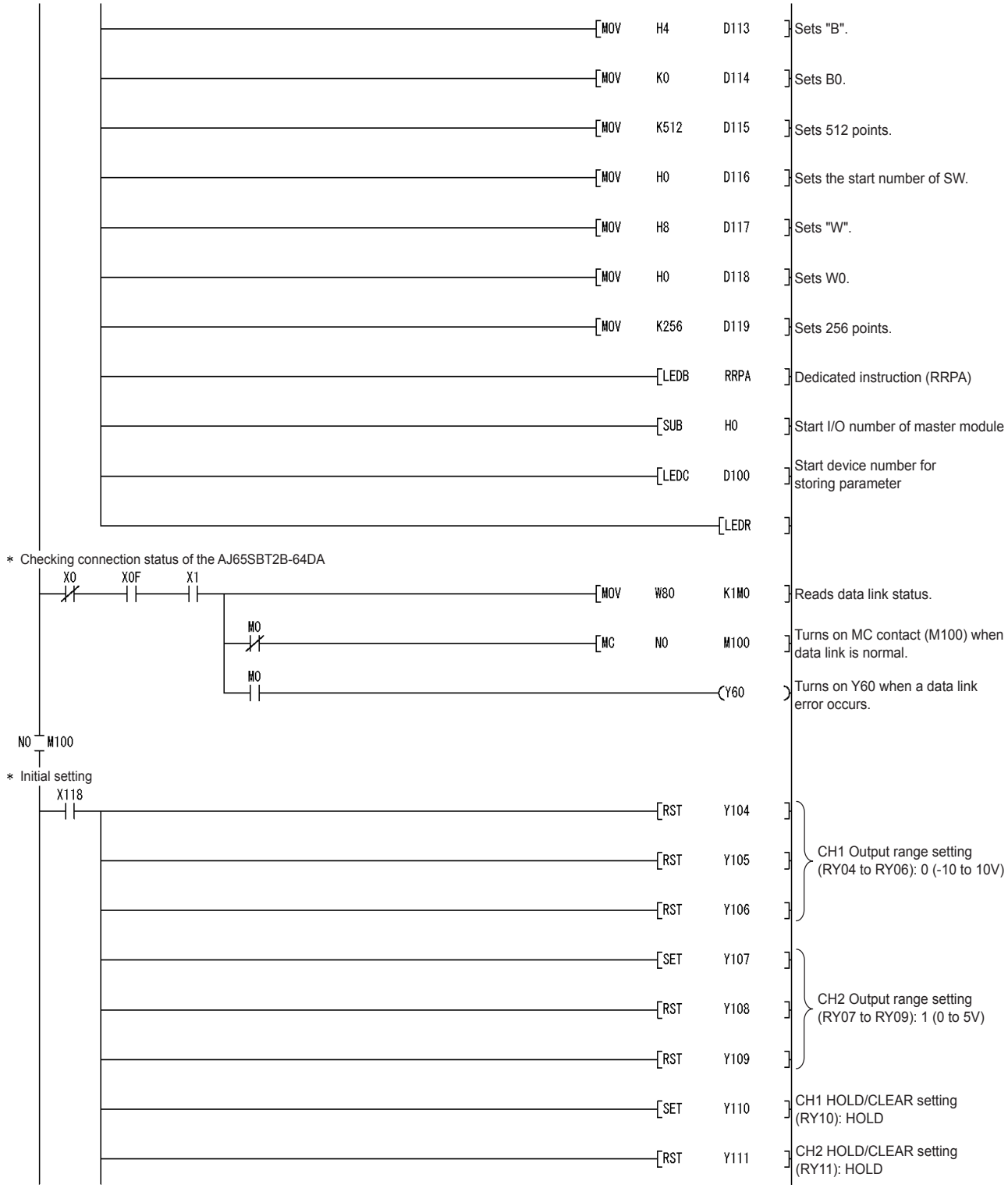


Figure 5.14 Program example (when the ACPU/QCPU (A mode) is used (dedicated instructions)) 2/3

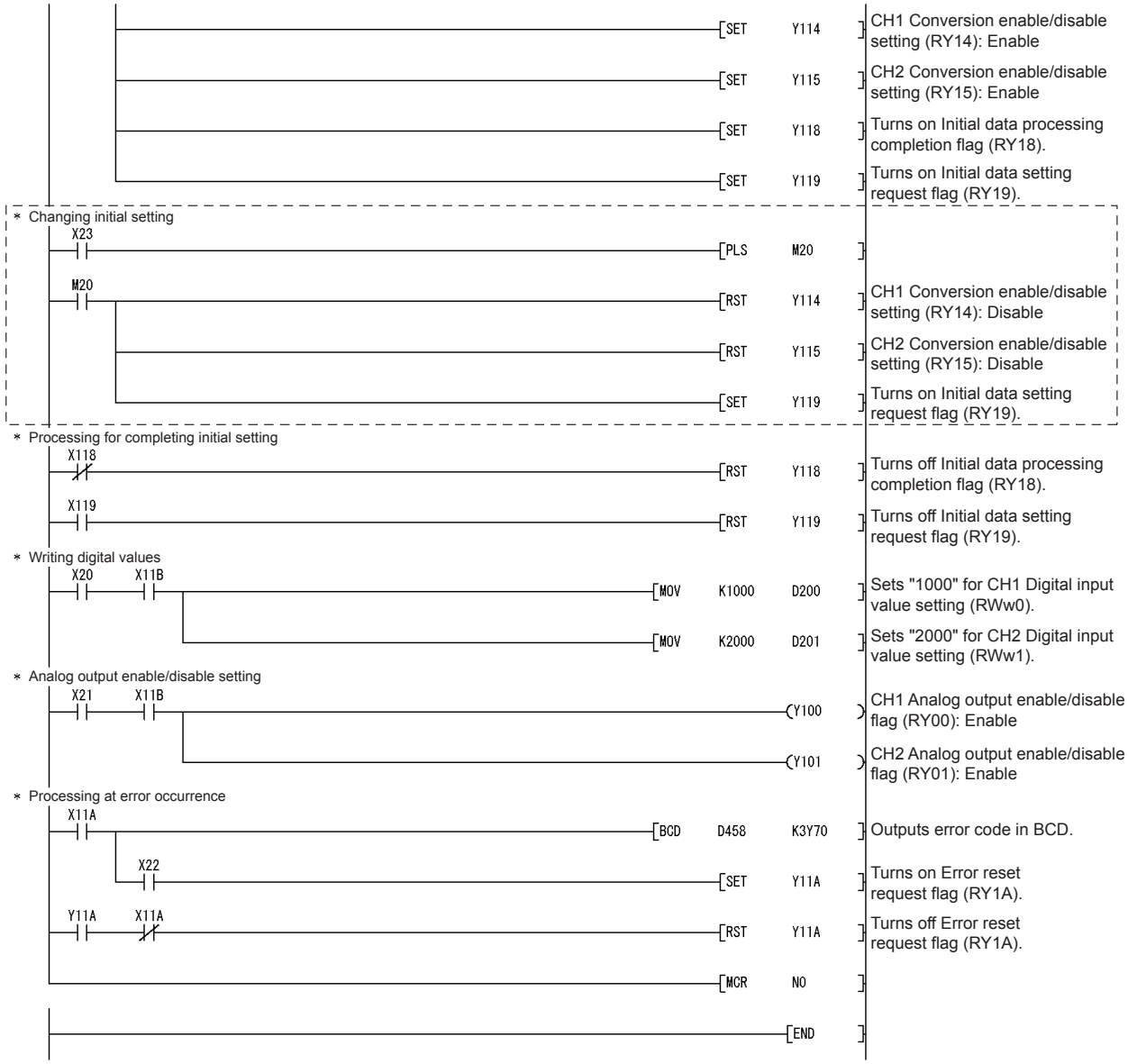


Figure 5.15 Program example (when the ACPU/QCPU (A mode) is used (dedicated instructions)) 3/3

* 1: The program in the dotted area is required only when the initial setting is changed.

5.6 Program Example When the ACPU/QCPU (A mode) is Used (FROM/TO Instructions)

Parameters are set in the sequence program.

(1) List of devices used in the program example

Table 5.8 List of devices used in the program example (when the ACPU/QCPU (A mode) is used (FROM/TO instructions))

Device	Description
X0	Module error
X1	Host station data link status
X6	Data link start by parameters in buffer memory normally completed
X7	Data link start by parameters in buffer memory failed
XF	Module ready
X20	Signal that is turned on to write the digital input value to CH1 Digital input value setting (RWw0) or CH2 Digital input value setting (RWw1) of the AJ65SBT2B-64DA
X21	Signal that is turned on to output the analog value from CH1 or CH2
X22	Signal that is turned on to reset an error
X23	Signal that is turned on to change the initial setting
X118	Initial data processing request flag
X119	Initial data setting completion flag
X11A	Error flag
X11B	Remote ready
Y0	Refresh instruction
Y6	Request for data link start by parameters in buffer memory
Y60	Signal that is output when a data link error occurs
Y70 to Y72	Signal that is output an error code in BCD
Y100 to Y11A	Signal for settings of the AJ65SBT2B-64DA
M0	Signal that stores the data link status of the AJ65SBT2B-64DA 0 (Off): Data link normal 1 (On): Data link error
M10	Network parameter setting start pulse signal
M20	Initial setting change command pulse
M100	Master control contact
D0 to D4	Device for Network parameter setting
D100	Device that stores host station parameter status when the instruction is completed in error
D200	CH1 Digital input value setting
D201	CH2 Digital input value setting

(2) Program example

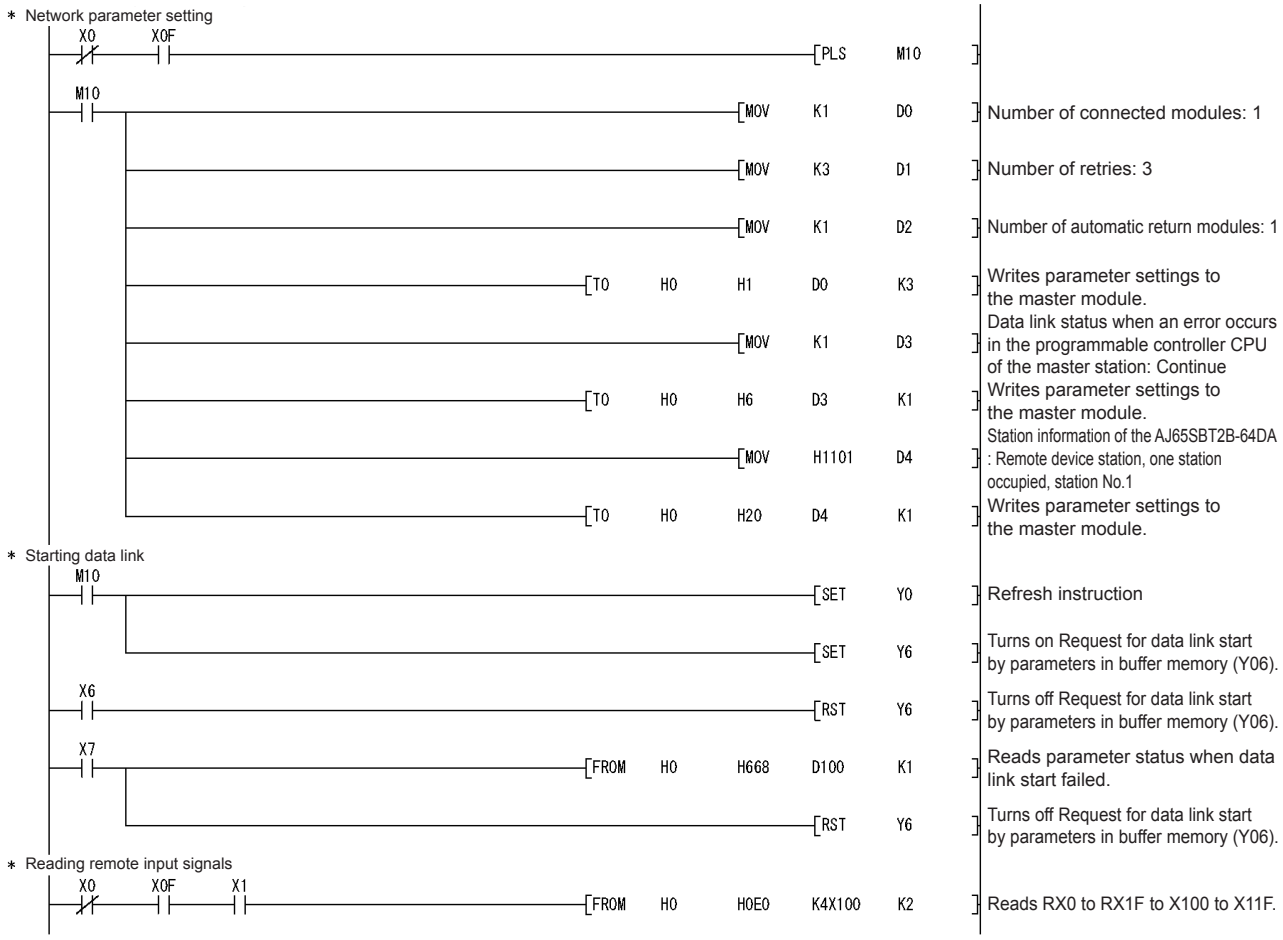

* Network parameter setting
X0
X0F
PLS M10
M10
MOV K1 D0
Number of connected modules: 1
MOV K3 D1
Number of retries: 3
MOV K1 D2
Number of automatic return modules: 1
TO H0 H1 D0 K3
Writes parameter settings to the master module.
MOV K1 D3
Data link status when an error occurs in the programmable controller CPU of the master station: Continue
TO H0 H6 D3 K1
Writes parameter settings to the master module.
MOV H1101 D4
Station information of the AJ65SBT2B-64DA : Remote device station, one station occupied, station No.1
TO H0 H20 D4 K1
Writes parameter settings to the master module.
* Starting data link
M10
SET Y0
Refresh instruction
SET Y6
Turns on Request for data link start by parameters in buffer memory (Y06).
X6
RST Y6
Turns off Request for data link start by parameters in buffer memory (Y06).
X7
FROM H0 H668 D100 K1
Reads parameter status when data link start failed.
RST Y6
Turns off Request for data link start by parameters in buffer memory (Y06).
* Reading remote input signals
X0
X0F
X1
FROM H0 H0E0 K4X100 K2
Reads RX0 to RX1F to X100 to X11F.

Figure 5.16 Program example (when the ACPU/QCPU (A mode) is used (FROM/TO instructions)) 1/3

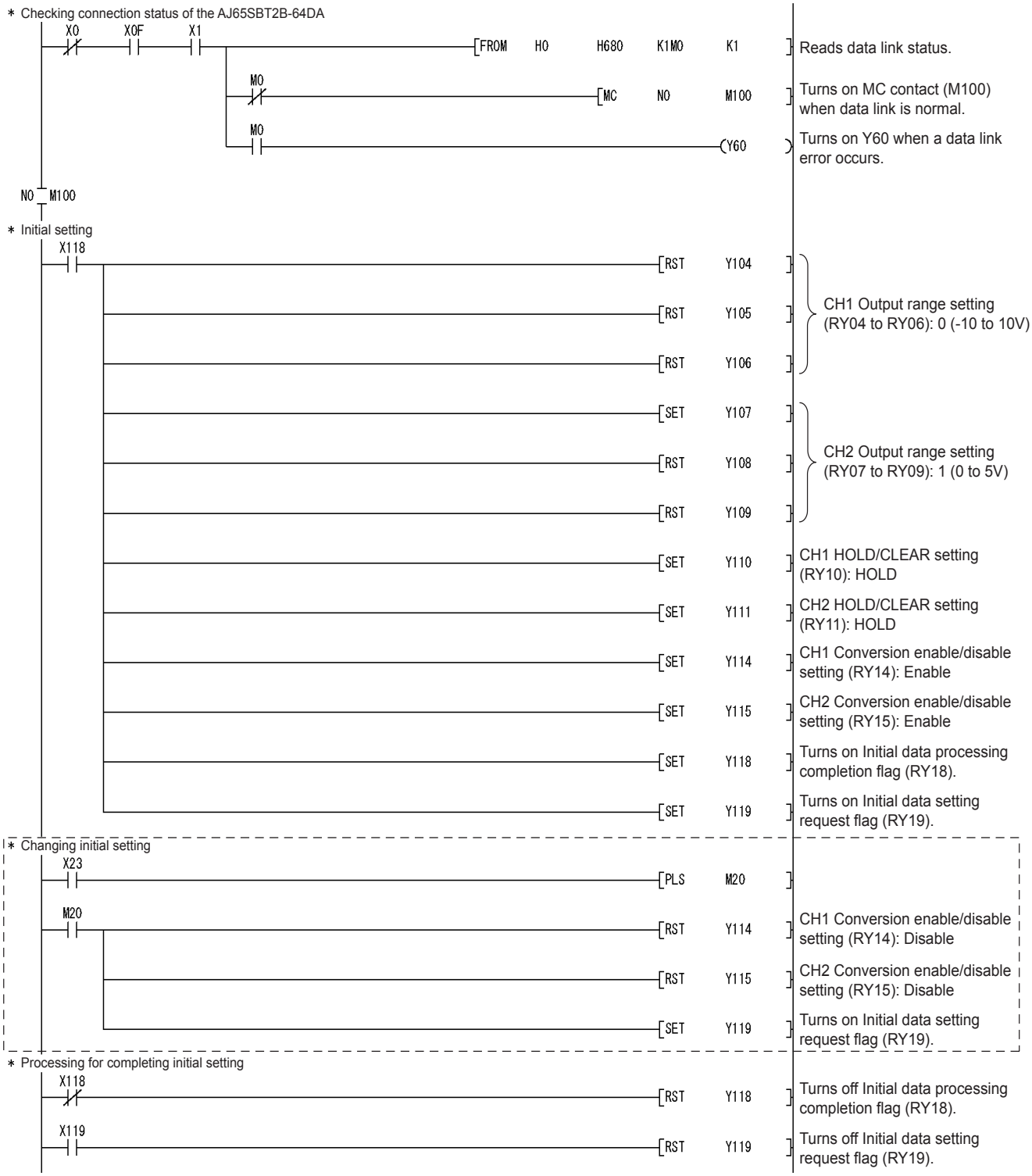


Figure 5.17 Program example (when the ACPU/QCPU (A mode) is used (FROM/TO instructions)) 2/3

* 1: The program in the dotted area is required only when the initial setting is changed.

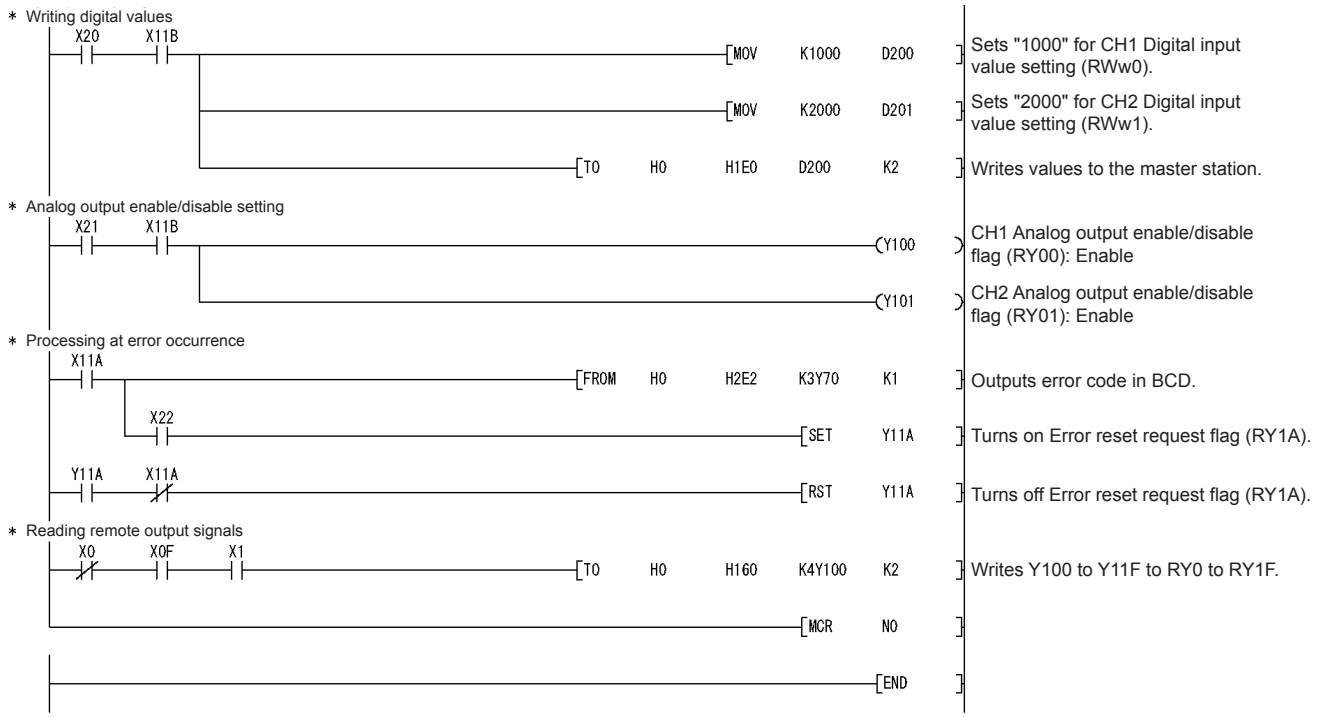


Figure 5.18 Program example (when the ACPU/QCPU (A mode) is used (FROM/TO instructions)) 3/3

CHAPTER6 TROUBLESHOOTING

This chapter describes the errors which may occur during the use of the AJ65SBT2B-64DA and troubleshooting.

6.1 Error Code List

If an error occurs when data is written to the master module from the programmable controller CPU (if the "RUN" LED of the AJ65SBT2B-64DA flashes), Error flag (RX(n+1)A) turns on and the corresponding error code shown in Table 6.1 is stored in Error code (RWrn+2).

Table 6.1 Error code list (Errors detected in the AJ65SBT2B-64DA)

Error code (decimal)	Description	Corrective action
11☐	The set digital input value is outside the setting range.	Set the digital input value within the setting range.
20☐	The set output range setting is outside the setting range.	Set the output range setting within the setting range.

* ☐ indicates the error channel number.

(a) When the digital input value setting error occurs, the "RUN" LED flashes at intervals of 0.5s and D/A conversion is performed using the upper or lower limit value.
When the output range setting error occurs, the "RUN" LED flashes at intervals of 0.1s and D/A conversion is not performed on any channels.

(b) When two or more errors occurred, only the error code of the first error is stored. The error codes of the second or later errors are not stored.

(c) The error code can be reset by turning on Error reset request flag (RY(n+1)A).

6.2 Checking Errors Using LED Indications

This section describes how to check errors using the LED indications of the AJ65SBT2B-64DA.
For the errors regarding the programmable controller CPU and master module, refer to the user's manuals of the programmable controller CPU and master module, respectively.

(1) When the "PW" LED of the AJ65SBT2B-64DA turns off

Table 6.2 When the "PW" LED of the AJ65SBT2B-64DA turns off

Check item	Corrective action
Is 24VDC power supplied?	Check the external power supply.
Is the voltage of the 24VDC power supply within the specified value?	Set the voltage value within the range 20.4 to 28.8V.

(2) When the "RUN" LED of the AJ65SBT2B-64DA flashes

Table 6.3 When the "RUN" LED of the AJ65SBT2B-64DA flashes

Check item	Corrective action
Is the LED flashing at 0.1s intervals in normal mode?	1. Check the output range setting error channel in Error code (RWrn+2). 2. Correct the sequence program.
Is the LED flashing at 0.5s intervals in normal mode?	1. Check the digital input value setting error channel in Error code (RWrn+2). 2. Check the code in Check code (RWrn, RWrn+1) of the error channel. 3. Correct the sequence program.
Is the LED flashing at 0.5s intervals in test mode?	Re-set the offset/gain values within the available setting range.

(3) When the "RUN" LED of the AJ65SBT2B-64DA turns off

Table 6.4 When the "RUN" LED of the AJ65SBT2B-64DA turns off

Check item	Corrective action
Has the watchdog timer error occurred?	Check the watchdog timer error using the link special register (SW0084 to 0087) of the master module and supply power to the AJ65SBT2B-64DA once again. If the "RUN" LED does not turn on after power is supplied again, the module may have failed. Please consult your local Mitsubishi representative.
Has the TEST terminals been shorted to enter test mode?	Open the TEST terminals after setting offset/gain values.

(4) When the "L RUN" LED of the AJ65SBT2B-64DA turns off

Communication has been disconnected.
For details, refer to the troubleshooting section in the user's manual of the master module used.

(5) When the "L ERR." LED of the AJ65SBT2B-64DA flashes regularly

Table 6.5 When the "L ERR." LED of the AJ65SBT2B-64DA flashes regularly

Check item	Corrective action
Have the station number setting switches been changed during normal operation?	Set the station number setting switches properly, and then supply power to the module once again.
Have the station number setting switches failed?	If the "L ERR." LED starts flashing without the switch setting being changed during operation, the module may have failed. Please consult your local Mitsubishi representative.

(6) When the "L ERR." LED of the AJ65SBT2B-64DA flashes irregularly

Table 6.6 When the "L ERR." LED of the AJ65SBT2B-64DA flashes irregularly

Check item	Corrective action
Is the terminating resistor connected?	Check that the terminating resistor is connected. If not, connect it and supply power to the module once again.
Is the L TER. switch on when the AJ65SBT2B-64DA is not connected at the end of the network?	Turn off the L TER. switch.
Is the module or CC-Link dedicated cable affected by noise?	Ground both ends of the shield part of CC-Link dedicated cable to the protective ground conductor via the SLD and FG terminals of each module. Ground the FG terminal of the module without fail. When wiring is performed using pipes, ground the pipes without fail.

(7) When the "L ERR." LED of the AJ65SBT2B-64DA turns on

Table 6.7 When the "L ERR." LED of the AJ65SBT2B-64DA turns on

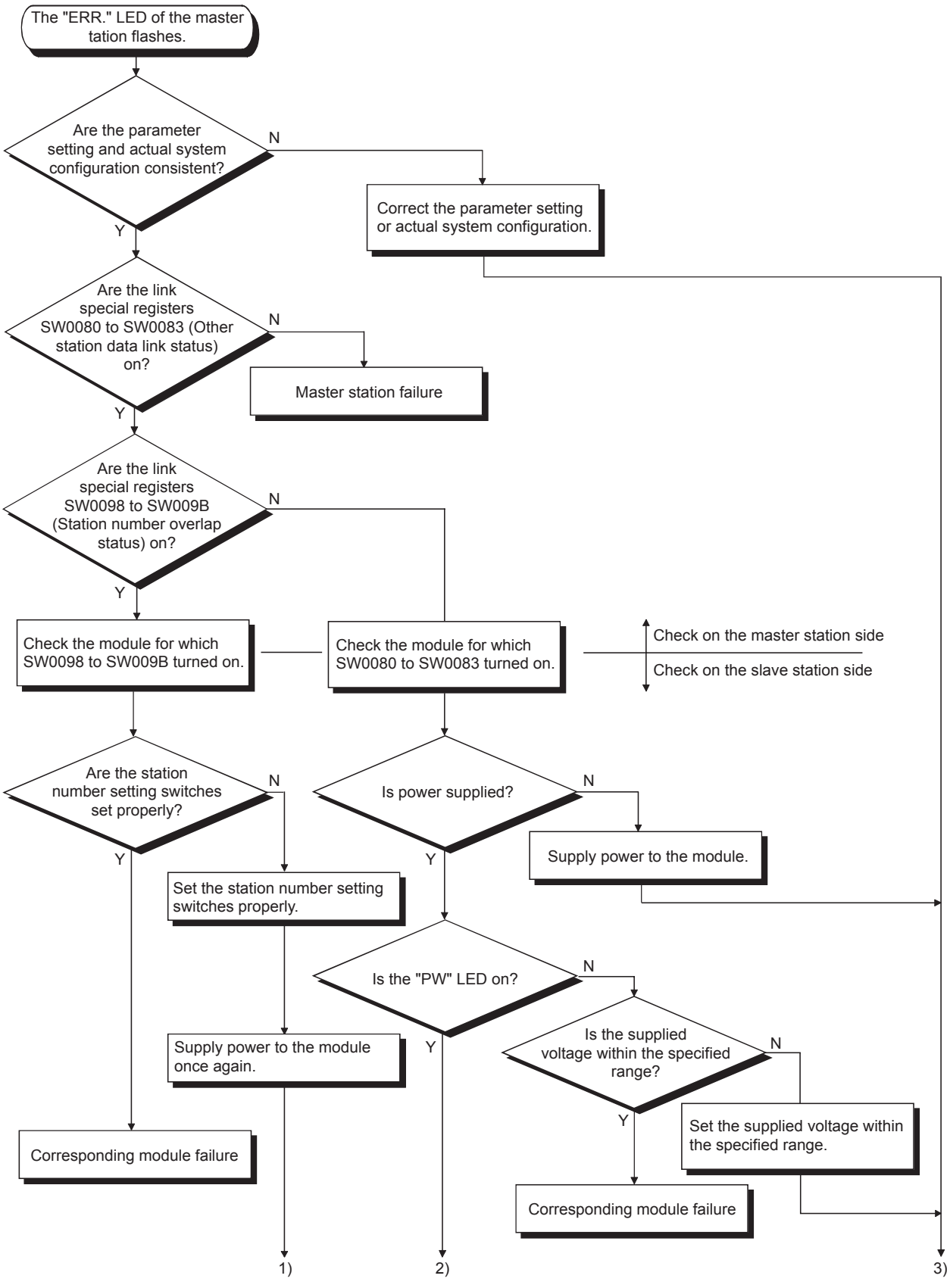
Check item	Corrective action
Is the station number setting correct?	Set the correct station number.

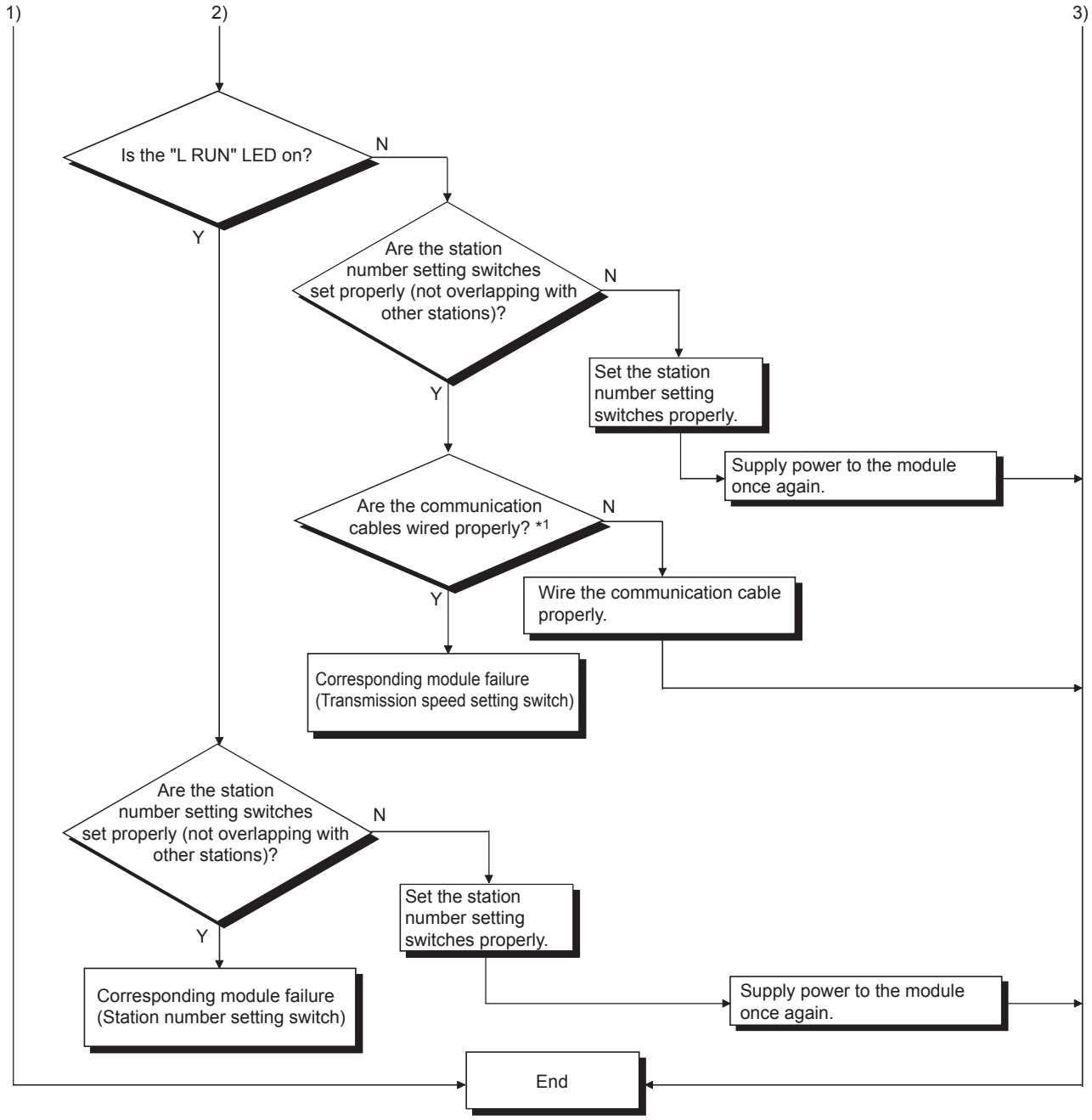
6.3 Troubleshooting When Analog Output Values are Not Output

Table 6.8 Troubleshooting when analog output values are not output

Check item	Corrective action
Is power supplied to the external power supply terminals?	Supply voltage of 24VDC to the external power supply terminals.
Are analog signal lines connected properly (not disconnected)?	Identify the failure location by conducting visual check or cable check, and then re-wire the cables.
Is the operating status of the CPU module in STOP?	Change the operating status to RUN.
Is the offset/gain setting correct?	Check that the offset/gain setting is correct. If the user range setting is used, change the output range to another default setting range and check if D/A conversion is performed properly. If D/A conversion is performed properly, re-set the offset/gain values.
Is the output range setting correct?	Check CH☐ Range setting (RYn4 to RYnF) using the monitor function of GX Developer. When the setting is wrong, correct the sequence program.
Is Analog output enable/disable flag of the output target channel set to "Disable"?	Check CH☐ Analog output enable/disable flag (RYn0 to RYn3) using the monitor function of GX Developer. When the setting is wrong, correct the sequence program.
Is Conversion enable/disable setting of the output target channel set to "Disable"?	Check CH☐ Conversion enable/disable setting (RY(n+1)4 to RY(n+1)7) using the monitor function of GX Developer. When the setting is wrong, correct the sequence program.
Is the digital input value written to the output target channel?	Check the CH☐ Digital input value setting (RWwm to RWwm+3) using the monitor function of GX Developer.

6.4 Troubleshooting When the "ERR." LED of the Master Station Flashes


The "ERR." LED of the master tation flashes.
Are the parameter setting and actual system configuration consistent?
N
Y
Correct the parameter setting or actual system configuration.
Are the link special registers SW0080 to SW0083 (Other station data link status) on?
N
Y
Master station failure
Are the link special registers SW0098 to SW009B (Station number overlap status) on?
N
Y
Check the module for which SW0098 to SW009B turned on.
Check the module for which SW0080 to SW0083 turned on.
Check on the master station side
Check on the slave station side
Are the station number setting switches set properly?
N
Y
Set the station number setting switches properly.
Is power supplied?
N
Y
Supply power to the module.
Is the "PW" LED on?
N
Y
Supply power to the module once again.
Is the supplied voltage within the specified range?
N
Y
Set the supplied voltage within the specified range.
Corresponding module failure
Corresponding module failure
1)
2)
3)


1)
2)
3)
Is the "L RUN" LED on?
N
Y
Are the station number setting switches set properly (not overlapping with other stations)?
N
Y
Set the station number setting switches properly.
Supply power to the module once again.
Are the communication cables wired properly? *1
N
Y
Wire the communication cable properly.
Corresponding module failure (Transmission speed setting switch)
Are the station number setting switches set properly (not overlapping with other stations)?
N
Y
Set the station number setting switches properly.
Corresponding module failure (Station number setting switch)
Supply power to the module once again.
End

*1 Check for a short circuit, reversed connection, disconnection, terminating resistor, FG connection, overall cable distance, and station-to-station distance.

6.5 When Flash Memory Read Error Flag (RXnA) Turns on

This indicates that an error has occurred while reading data from the Flash memory.

When this flag turns on, supply power to the AJ65SBT2B-64DA once again.
If Flash memory read error flag (RXnA) is still on after power is supplied to the module once again, the AJ65SBT2B-64DA may have failed.
Please consult your local Mitsubishi representative, explaining a detailed description of the problem.

6.6 When User Range Read Error Flag (RXnB) Turns on

This indicates that an error has occurred while reading the user range setting data.

When this flag turns on, re-set the offset/gain values on all channels which use the user range setting.
If User range read error flag (RXnB) is still on after the offset/gain values are re-set, the AJ65SBT2B-64DA may have failed. Please consult your local Mitsubishi representative, explaining a detailed description of the problem.

6.7 When Flash Memory Write Error Flag (RXnC) Turns on

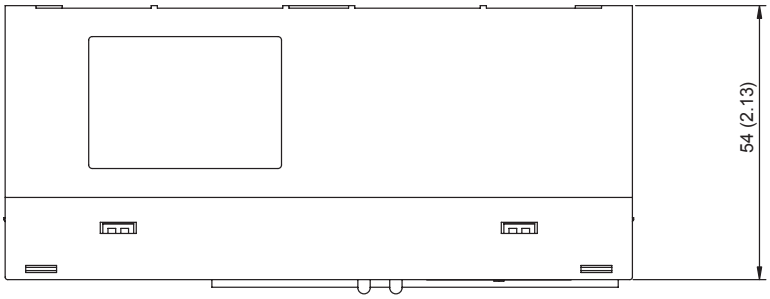
This indicates that the number of writes to the Flash memory which is performed during offset/gain setting or transmission speed automatic setting exceeds the limit (10000 times).

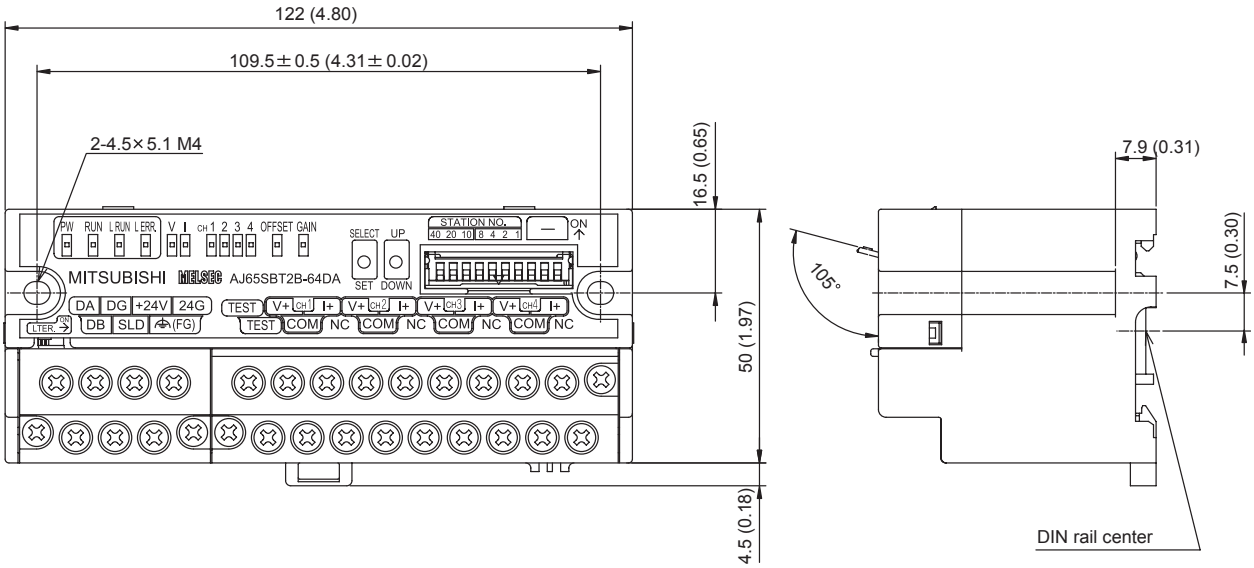
When this flag turns on, supply power to the AJ65SBT2B-64DA once again.
If Flash memory write error flag (RXnC) is still on after power is supplied to the module once again, the AJ65SBT2B-64DA may have failed.
Please consult your local Mitsubishi representative, explaining a detailed description of the problem.

APPENDIX

Appendix 1 External Dimensions

The external dimensions of the AJ65SBT2B-64DA is shown below.





Unit: mm (inch)

Memo

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Warranty

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.

Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued.

Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not , compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

6. Product application

(1) In using the Mitsubishi MELSEC programmable controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.

(2) The Mitsubishi programmable controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or Public service purposes shall be excluded from the programmable controller applications.

In addition, applications in which human life or property that could be greatly affected, such as in aircraft, medical applications, incineration and fuel devices, manned transportation, equipment for recreation and amusement, and safety devices, shall also be excluded from the programmable controller range of applications.

However, in certain cases, some applications may be possible, providing the user consults their local Mitsubishi representative outlining the special requirements of the project, and providing that all parties concerned agree to the special circumstances, solely at the users discretion.

Digital-Analog Converter Module Type AJ65SBT2B-64DA

User's Manual

MODEL	AJ65S-64DA-U-SY-E
MODEL CODE	13JZ19
SH(NA)-080768ENG-A(0808)MEE	

MITSUBISHI ELECTRIC CORPORATION

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